KNOWLEDGE MANAGEMENT

BS(LIS)

Code No. 9223 **Units: 1-9**

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DEPARTMENT OF LIBRARY AND INFORMATION SCIENCES
FACULTY OF SOCIAL SCIENCES & HUMANITIES
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CONTENTS

FOREWORD

Department of Library and Information Sciences was established in 1985 under the flagship of the Faculty of Social Sciences and Humanities intending to produce trained professional manpower. The department is currently offering seven programs from certificate courses to PhD levels for fresh and/or continuing students. The department is supporting the mission of AIOU keeping in view the philosophies of distance and online education. The primary focus of its programs is to provide a quality education by targeting the educational needs of the masses at their doorstep across the country.

BS 4-year in Library and Information Sciences (LIS) is a competency-based learning program. The primary aim of this program is to produce knowledgeable and ICT-based skilled professionals. The scheme of study for this program is specially designed on the foundational and advanced courses to provide in-depth knowledge and understanding of the areas of specialization in librarianship. It also focuses on general subjects and theories, principles, and methodologies of related LIS and relevant domains.

This new program has a well-defined level of LIS knowledge and includes courses in general education. The students are expected to advance beyond their higher secondary level and mature and deepen their competencies in communication, mathematics, languages, ICT, general science, and an array of topics in social science through analytical and intellectual scholarship. Moreover, the salient features of this program include practice-based learning to provide students with a platform of practical knowledge of the environment and context, they will face in their professional life.

This program intends to enhance students' abilities in planning and controlling library functions. The program will also produce highly skilled professional human resources to serve libraries, resource access centres, documentation centers, archives, museums, information centers, and LIS schools. Further, it will also help students to improve their knowledge and skills of management, research, technology, advocacy, problem-solving, and decision-making relevant to information work in a rapidly changing environment along with integrity and social responsibility. I welcome you all and wish you good luck in your academic exploration at AIOU!

Prof. Dr. Nasir Mahmood
Acting Vice-Chancellor

PREFACE

The rapid development of information and communication technologies, mainly the Internet, the World Wide Web, and social media technologies, have supported sharing of information and knowledge at individual, team, and organization levels. The importance of knowledge assets is recognized in all enterprises, including higher education institutes. Especially during the last two decades, knowledge has been recognized as a strategic resource to maintain a competitive advantage globally. The effective utilization of knowledge is critical to achieving the goals of the organization. This realization led organizations to pursue strategies to manage knowledge resources explicitly.

Knowledge is a valuable core asset of an organization and has been managed in different forms for centuries. Despite the several issues of defining knowledge and its management, academicians and practitioners unanimously agree that knowledge is an essential resource that improves performance both at an individual and organizational level. Also, organizations' knowledge management prevents the waste of money, time, and human resources. So, keeping in view the significance of knowledge resources, organizations are paying attention to managing intangible assets. The growth in the knowledge management domain is quite visible in conferences, books, standardization in knowledge management practices, establishments of consulting firms, and visibility of knowledge management as an academic discipline.

Due to the multifaceted and multilayered complexity of knowledge and the interdisciplinary nature of the field, knowledge management is complicated. From the higher education perspective, resistance to change, lack of commitment, and individual cooperation are key challenges to developing knowledge management systems. Despite several technological, cultural, social, privacy, and security challenges to knowledge management in the entire business, organizations are developing strategies that could successfully leverage individual and organizational knowledge. Knowledge management benefits cannot be achieved through short terms plans, especially in developing countries like Pakistan. People are the core actors that create knowledge at individual, team, and organization levels. Moreover, knowledge management is not entirely a technology-based field. Technology is just a key enabler of knowledge management. Individuals are key players that initiate knowledge management programs with the support of technology.

Keeping in view the importance of the knowledge management field and the key role of people in managing knowledge resources in the knowledge economy world, this knowledge management course has been designed for BS students in such a way that

they could perform as knowledge workers in the entire enterprise. Specifically, this study guide provides theoretical underpinnings on the nine key themes of knowledge management, namely, (1) the nature of knowledge, (2) communities of practice, (3) organizational learning and learning organizations, (4) intellectual capital and the knowledge economy, (5) knowledge sharing, (6) knowledge representation and content management, (7) taxonomies and ontologies, (8) informatics and information technology, and (9) the future of knowledge management. The knowledge and skill acquired through this course would support university students in strengthening the theoretical foundation which is critically required for designing and implementing knowledge management systems.

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Faculty of Social Sciences & Humanities

ACKNOWLEDGEMENTS

INTRODUCTION OF THE COURSE

The knowledge management course consists of nine units. The introduction provided at the start of each unit summarizes the contents that unit. The students should study every unit carefully to have an idea of the whole course and prepare themselves for assignments, assessment questions, activities, and final examinations. For easy conceptualization of the knowledge management course, a brief introduction is presented in the following paragraphs.

Knowledge management is a systematic approach to ensure the full utilization of an organization's knowledge base, coupled with the potential of individual skills, competencies, thoughts, innovations, and ideas to create a more efficient and effective organization (Dalkir, 2017). The management and other disciplines theorists have defined and explained the complexity of knowledge and issues associated to manage knowledge assets in different domains, for example, business, information systems, library and information science, cognitive science, process/technology, and so on. However, all the stakeholders unanimously agreed upon the importance and significance of intellectual assets in the entire enterprise (Dalkir, 2017; Wiig, 1997; Nonaka & Takeuchi, 1995).

Knowledge is a multifaceted concept with multilayered meanings (Nonaka 1994). Several authors define knowledge according to the studies' context. Davenport and Prusak (1998) define knowledge as, it is a fluid mix of framed experience, values, contextual information, and expert insights that provide a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers. According to Walker (2017), knowledge is subjective and valuable information that has been validated and has been organized into a model (mental model); used to make sense of our world; typically originates from accumulated experience; incorporates perceptions, beliefs, and values.

Knowledge is highly context specific, therefore, it is important to conceptualize knowledge by studying knowledge taxonomies. Numerous authors developed knowledge taxonomies. Among the knowledge taxonomies, Nonaka and Takeuchi's (1995) classification of knowledge is quite well-known. According to them, knowledge can be grouped into explicit and tacit knowledge. Explicit knowledge can be expressed in words, and numbers, and easily communicated and shared in the form of data, scientific formulae, codified procedures, or universal principles. In contrast, tacit knowledge is not easily visible and expressible. It is highly personal and hard to formalize, making it difficult to communicate or share with others. Subjective insights, skills, intuitions, and hunches are prominent example of tacit knowledge.

For sharing information and knowledge, a community of practice is quite helpful. Unit 2 explains the notion of a community of practice. A community of practice consists of three dimensions: (1) joint enterprise, which is a shared understanding through members' interactions that binds them together and is continually renegotiated by its domain members; (2) mutual engagement refers to how members establish norms and develop collaborative relationships through participation in the community to form a social entity; and (3) shared repertoire means the communal resources, experiences, stories, tools, ways of addressing recurring problems etc., produced as part of the community practice and are used in the pursuit of the joint enterprise (Wenger, 1998). The notion of a community of practice is closely linked with other related concepts such as professional communities, discourse communities, learning communities, etc. These concepts are quite helpful to comprehend the concept of a community of practice (Wallace, 2007).

Knowledge is shared at an individual, group, and organization level. Organizations in entire enterprise can create value in their business processes by providing a conducive environment. So, the concepts of organizational learning and learning organizations explained in unit 3, are critically important for students. Organizational learning is referred to learning what worked and what did not work from the past and effectively transferring this experientially learned knowledge to present-day and future knowledge workers. So, it can be inferred that organizational learning is a process through which an organization learn from its successes (best practices and innovations) and its failures (lessons learned) over time. To learn from the past and to be innovative in future, there should be a mechanism to leverage the collective experience of the organization, and the ability to obtain help in reusing or putting this collective knowledge into action so each can better performs its job (Dalkir, 2017). On the contrary, a learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights (Garvin, 1993).

Explicit and tacit knowledge support firms to sustain themselves in the contemporary competitive economy and intellectual capital and the knowledge economy. Intellectual capital is a dynamic entity and is closely linked with knowledge management (Jashapara, 2004). Unit 4 discusses intellectual capital and the knowledge economy. According to Bontis, Dragonetti, Jacobsen, and Roos (1999), intellectual capital is a collection of intangible assets and flows that contribute to the company's value-creating process. Traditionally, intellectual capital is categorized into three types: (1) human capital, (2) structural capital, and (3) customer capital/relational capital (Bontis, 1998). The knowledge economy is an economy based primarily on knowledge rather than other factors of production such as labour or technology (Jashapara, 2004).

Among the other activities of knowledge management, knowledge sharing is critically important for bringing innovation in organizations to achieve competitive advantage. Unit 5 explains knowledge sharing and its related concepts such as knowledge hoarding and knowledge transfer. Important knowledge-sharing models and theories are also explained.

The chief objective of any information and knowledge system is to provide the right information to the right person at the right time in the right format. To design such systems, students must learn fashion techniques of knowledge representation and content management. Unit 6 describes knowledge representation and cognition, knowledge representation and artificial intelligence, and the key role of knowledge representation. It also explains content management, content management system, and their types.

Knowledge management systems require a significant theoretical foundation to organize knowledge assists. Knowledge taxonomies and ontologies provide the required support. Unit 7 highlights the significance of taxonomies and ontologies in the knowledge management domain. For easy conceptualization of taxonomies and ontologies, the aim and types of the concepts are discussed.

The impact of information and communication technologies is quite visible in every aspect of life. Informatics is concerned with the study of the nature of information and technology focusing on how people bring them together to produce and manage information and knowledge. So, unit 8 highlights the role of informatics and information technology in knowledge management. Also, what is social informatics and why it is important in the knowledge management domain?

In the end, unit 9 provides a comprehensive account of the evolution, challenges, and future of the knowledge management field. To know the current status of knowledge management from the Pakistani perspective, the unit also provides a brief commentary.

OBJECTIVES

After studying the knowledge management course, you should be able to define and explain the following concepts:

1. Nature of knowledge

2. Communities of practice

3. Organizational learning and learning organizations

4. Intellectual capital and the knowledge economy

5. Knowledge sharing

6. Knowledge representation and content management

7. Taxonomies and ontologies

8. Informatics and information technology

9. The future of knowledge management.

Unit–1

THE NATURE OF KNOWLEDGE

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Reviewed by: Dr. Munazza Jabeen

CONTENTS

INTRODUCTION

In the contemporary world, knowledge is one of the most valuable strategic assets that support organizations to bring innovation both in products and processes to sustain in the competitive market. The rapid changes due to the advances in technology and globalization have compelled organizations to recognize knowledge resources. Especially, during the last decade, knowledge has been accepted as a strategic resource for organizations to maintain a competitive advantage in the global market. This realization led organizations to pursue strategies to manage knowledge explicitly (Wiig, 1997). In the knowledge management domain, researchers define knowledge from different perspectives.

Knowledge is a multifaceted concept with multilayered meanings (Nonaka, 1994). Thus, it is important to know about knowledge and its different taxonomies for a better understanding of knowledge. If an individual understands how to define knowledge in a particular situation, then it would be easy to manage knowledge resources effectively.

Both the terms, knowledge and information are often used interchangeably although the two concepts have clear distinctions (Nonaka & Takeuchi, 1995). Moreover, data and information are useful tools for constructing new knowledge (Stenmark, 2001). Several authors have differentiated the terms data, information, knowledge, and wisdom. For a better understanding of knowledge, this introductory unit describes different dentitions of knowledge, classification of knowledge and why knowledge is important.

OBJECTIVES

After reading this unit, you should be able to:

- Understand how and why knowledge is important

- Explain the nature of knowledge

- Explain the characteristics of knowledge

- Differentiate between data, information, and knowledge

- Comprehend knowledge types

1.1 DEFINITION OF KNOWLEDGE

A definition of knowledge is itself knowledge; thus, this unit deals essentially with knowledge about knowledge—that is, meta-knowledge. Knowledge is a highly multidimensional phenomenon and can be studied from many points of view (Ein-Dor, 2011). Since ancient times, researchers defined knowledge in different ways. The traditional Greek definition of knowledge is referred to as a justified true belief. However, such a definition of knowledge gives the impression that knowledge is objective, absolute, and context-free. So, rather than focusing on truth, it is suggested that knowledge be considered from a justified belief perspective (Nonaka, Toyama, & Hirata, 2008).

According to Davenport and Prusak (1998), knowledge is a fluid mix of framed experience, values, contextual information, and expert insights that provide a framework for evaluating and incorporating new experiences and information. It originates and is applied in the mind of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms. Knowledge could be considered as 'actionable information' (Jashapara, 2004). According to Dalkir (2017), knowledge is subjective and valuable information that has been validated and organized into a model (mental model); used to make sense of our world; typically originates from accumulated experience; incorporates perceptions, beliefs, and values. From an international organization perspective, Dumitriu (2016) defined knowledge as subjective and valuable information that has been validated and organized into a mental model; typically originates from accumulated experience; incorporates perceptions, beliefs and values.

1.2 CHARACTERISTICS OF KNOWLEDGE

In the contemporary world, knowledge in an organization is considered a key strategic asset to sustain in the competitive market. Knowledge as a commodity or intellectual asset has some paradoxical characteristics that are radically different from other valuable commodities. These knowledge characteristics are described as follows:
- Using knowledge does not consume it.
- Transferring knowledge does not result in losing it.
- Knowledge is abundant, but the ability to use it is scarce.
- Much of an organization's valuable knowledge walks out the door at the end of the day (Dalkir, 2017).

1.3 DATA, INFORMATION, KNOWLEDGE, AND WISDOM HIERARCHY

For better comprehension of knowledge, it is also important for students to be able to differentiate between data, information, knowledge, and wisdom. During the late 1980s, several authors defined data, information, knowledge, and wisdom hierarchy. Ackoff's (1989) model is widely cited and is considered a well-known framework that addresses data, information, knowledge, and wisdom comprehensively (Jennex & Bartczak,2013).

According to Ackoff (1989), data are symbols that represent the properties of objects and events. Information is contained in descriptions, and answers to questions that begin with such words as who, what, when, where, and how many. While knowledge is conveyed by instructions and answers to the how-to question. He differentiated wisdom and understanding from knowledge. As human can develop information, knowledge, and understanding through computerized systems. However, these systems cannot generate wisdom. In this pyramid, data, information, knowledge, and wisdom exist in a hierarchical relationship, as shown in Figure 1.1.
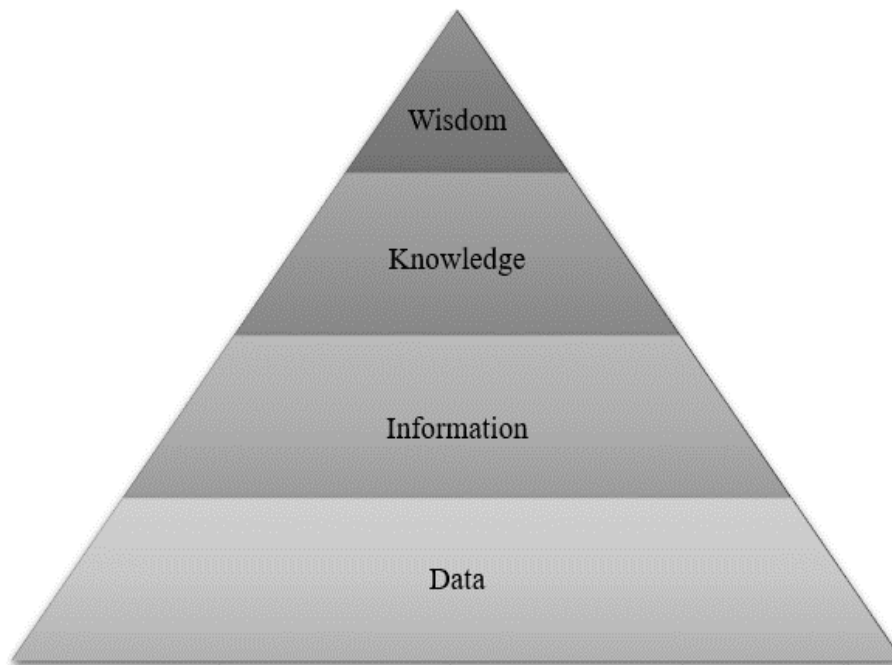
Figure 1.1: Data, information, knowledge wisdom hierarchy
Source: (Bernstein, 2009)

Data are discrete, objective facts about events, including numbers, letters, and images without context. Information is data with some level of meaning. It is usually presented to describe a situation or condition and, therefore has added value over data. Knowledge is built on data and information and created within the individual [or the organizational unit]. Knowledge, of course, has many levels and is usually related to a given domain of interest. In its strongest form, knowledge represents an understanding of the context, insights into the relationships within a system, and the ability to identify leverage points and weaknesses and to understand future implications of actions taken to resolve problems (Holsapple, 2013).

A major conclusion from the multidimensional view of knowledge presented here is that the distinctions usually made in the information system literature between data, information, and knowledge are largely irrelevant. A data item in an organization's information systems is simply a piece of knowledge that is generally explicit, declarative, social, and organizational. A manager's knowledge of an aspect of the marketplace is probably to a large extent implicit, individual, declaratively, procedurally mixed, and contextual. Any knowledge item may be classified on these dimensions as a basis for analysis and implementation. This view can lead to greater integration of the various kinds of knowledge embedded in information systems (Ein-Dor, 1986; Ein-Dor, 2011).

1.4 CLASSIFICATION OF KNOWLEDGE

It has been explained in the previous section that knowledge is highly context-specific. For a better understanding of knowledge, it is important to know about knowledge classification. Since knowledge is a multifaceted concept with multilayered meanings (Nonaka 1994). So, over the years several scholars have classified knowledge in diverse domains that caused the emergence of different knowledge taxonomies.

The following section explains some key knowledge taxonomies:

1.4.1 Explicit Versus Tacit Knowledge
Based on Polanyi's (1966) classification, Nonaka (1994) further elaborated knowledge. According to Nonaka (1994), knowledge can be classified into explicit and tacit. It may exist at different levels, individual, group and organizational levels (Nonaka & Takeuchi, 1995). Nonaka (1994) introduced the theory of organizational knowledge creation and explained how explicit and tacit knowledge interact to produce new knowledge.

1.4.2 Explicit Knowledge

Several authors explained explicit knowledge. Nonaka (1994) defines explicit knowledge as "knowledge that is transmittable in formal and systematic language" (p. 16). Explicit knowledge can be expressed in words, and numbers, and easily communicated and shared in the form of data, scientific formulae, codified procedures, or universal principles. More specifically, the knowledge expressed in words and numbers represents only the tip of the iceberg. Mainly knowledge exists is in tacit form (Nonaka & Takeuchi, 1995).

1.4.3 Tacit knowledge

In contrast to explicit knowledge, tacit knowledge is not easily visible and expressible. It is highly personal and hard to formalize, making it difficult to communicate or share with others. Subjective insights, skills, intuitions, and hunches are prominent example of tacit knowledge (Nonaka & Takeuchi, 1995).

Tacit knowledge can be segmented into two dimensions, namely, the technical dimension and the cognitive dimension. The technical dimension of tacit knowledge explains the kind of informal and hard-to-pin-down skills or crafts captured in the term know-how. The cognitive dimension consists of schemata, mental models, beliefs, and perceptions (Nonaka & Takeuchi, 1995). Since the majority of knowledge exists in tacit form, so, students are required to know about the knowledge. For further comprehension of the tacit form of knowledge, Wallace (2007) explains the characteristics of tacit knowledge:

- Tacit knowledge is personal in origin
- Tacit knowledge is valuable to the possessor
- Tacit knowledge is job specific
- Tacit knowledge is related to the context
- Tacit knowledge is difficult to fully articulate
- Tacit knowledge is both known in part and unknown in part to the possessor
- Tacit knowledge is transmitted, where transmission is possible, through interpersonal contact.
- Tacit knowledge is operative on an organizational level
- Tacit knowledge is applied, in part, through "if-then" rules.
- Tacit knowledge can become explicit knowledge and vice versa
- Tacit knowledge is intertwined with explicit knowledge along unstable knowledge borders
- Tacit knowledge is poorly reflected in contemporary knowledge literature

As explained above, explicit knowledge is just the tip of the iceberg so students and professionals should focus more on tacit knowledge if they want to get more benefits from knowledge in this competitive world. To be more precisely, Table 1.1 presents the properties of tacit and explicit knowledge.

Table 1.1: Tacit vs explicit dimension of knowledge

Properties of tacit knowledge	Properties of explicit knowledge
Ability to adapt, to deal with new and exceptional situations	Ability to disseminate, reproduce, access and re-apply throughout the organization
Expertise, know-how, know-why, and care-why	Ability to teach to train
Ability to collaborate, share a vision, to transmit a culture	Ability to organize, systematize; to translate a vision into a mission statement, into operational guidelines
Coaching and mentoring to transfer experiential knowledge on a one-to-one, face-to-face basis	Transfer knowledge via products, services, and documented processes

Source: (Dalkir, 2017)

1.4.4 Other Types of Knowledge

In the extant literature, no single definition of knowledge has been reported. Knowledge can be represented in mental, behavioural, symbolic, digital, visual, audio, and other sensory patterns that may occur in various object and process formats. Knowledge has a variety of attributes including mode (tacit vs. explicit), type (descriptive vs. procedural vs. reasoning), orientation (domain vs. relational vs. self), applicability (local vs. global), accessibility (public vs. private), immediacy (latent vs. currently actionable), perishability(shelf-life), and so forth (Holsapple & Joshi, 2004).

Machlup (1980) addressed the nature of knowledge in a wide variety of ways and classified knowledge into the following five classes:
1. Practical knowledge
   - Professional knowledge, (ii) business knowledge, (iii) Workman's knowledge, (iv) political knowledge, (v) household knowledge, and (vi) other practical knowledge

2.   Intellectual knowledge
3.   Small-talk and pastime knowledge
4.   Spiritual knowledge
5.   Unwanted knowledge

To understand knowledge, scholars suggest that individuals should concentrate on knowledge taxonomies. In knowledge management literature, several authors developed knowledge taxonomies. Some widely cited knowledge classifications are presented in Table 2.2.

Table 2.2: Knowledge Classification

Domain	Author	Types of Knowledge
Types	Polanyi (1966) & Nonaka& Takeuchi (1995)	Tacit, explicit
	Spender (1994, 1996)	Explicit, implicit, individual, and social
	Collins 1993	Embrained, embodied, encultured, embedded, and encoded.
	Conklin (1996)	Formal and informal
	Mcelroy (2000)	Declarative knowledge and procedural knowledge
	Chen, Ragsdell, O'Brien, & Nunes (2012)	Implicit knowledge, procedural knowledge, and experience
Level of knowledge	Wiig (1997)	Knowledge domain, knowledge region, knowledge section, knowledge segment, knowledge element, knowledge fragment, and knowledge atom
	Khandelwal & Gottschalk (2003)	Core knowledge, advanced knowledge, and innovative knowledge

Knowledge is a multidimensional artefact, and cognizance of the various dimensions is useful for understanding the nature of a body of knowledge and is required to completely specify an item of knowledge. The principal dimensions of knowledge recognized here are tacit/explicit, individual/social, declarative/

9

procedural, and task/context. The categorizations of a knowledge item may be graphically displayed as in the example in Figure 1.2 (Ein-Dor, 2011).
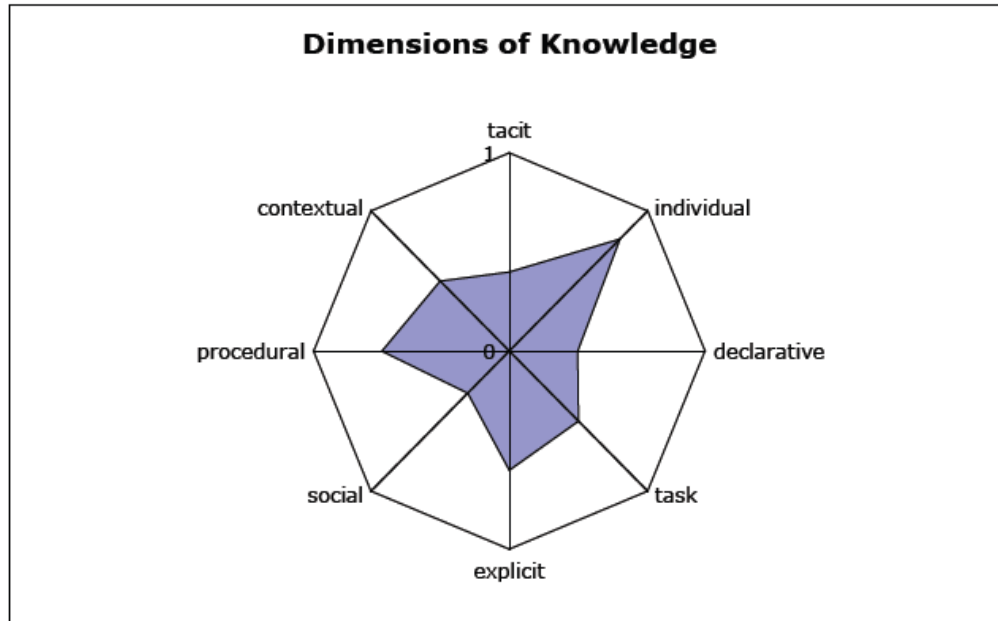

Figure 1.2: Example of dimensions of knowledge for a hypothetical knowledge item
Source: (Ein-Dor, 2011)

In knowledge-based organizations, knowledge is considered a key organizational asset that supports taking action (Davenport, & Holsapple, 2011). As the world is getting more and more technology savvy, the collection and distribution of information and knowledge need special attention (Upadhyaya, Rao, & Padmanabhan, 2011). Despite different classifications and definitions of knowledge, however, there is a unanimous agreement among knowledge management researchers that knowledge is a key strategic resource for sustainable competitive advantage in the knowledge-based economy (Tohidinia & Mosakhani, 2010).

1.5 SELF-ASSESSMENT QUESTIONS

1.   Do you think knowledge is a key strategic asset in today's world? If yes, how do you support the argument with solid justification?

2.   Who did develop state-of-the-art knowledge taxonomies? Do you agree that knowledge taxonomies are the key source to comprehending knowledge? If yes, how knowledge taxonomies are helpful to understand knowledge?

3. Does a knowledge taxonomy vary according to the context of the study discipline, if yes, why and how?

1.6 ACTIVITIES

1. Search scholarly literature in the Web of Science and identify literature that has explained knowledge definitions explicitly. By exploring different definitions of knowledge in the seminal works, define knowledge from your research perspective.

2. Visit an organization/university library and discuss with the working professionals what is knowledge and its main types being practised. How and why knowledge (explicit and tacit) is important to meet the information needs of customers in the digital age.

3. Explore literature to identify at least four to six knowledge taxonomies that are not explained in this unit.

4. Use concept analysis to clarify tacit knowledge from explicit knowledge.

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COMMUNITIES OF PRACTICE

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CONTENTS

INTRODUCTION

This unit explains what community of practice is and how this concept is important in knowledge management. For a better understanding of the notion of a community of practice, students need to understand first what is meant by the community. Oxford Advance Learner's Dictionary (1995) explains community in three ways. (1) The people living in one place, district or country, considered as a whole: work for the good of the community. (2) A group of people of the same religion, race, occupation, etc., or with a shared interest. (3) The condition of sharing, having things in common or being alike in some way. The community of practices support individuals to share both explicit and tacit knowledge. Sometimes rules and regulations are available to an individual however, he/she may be unable to interpret a specific rule or procedure for a specific situation. Sometimes a professional (working away from the company) who may need technical support after office hours, he/she may use the community of practice as a knowledge transfer tool. So, knowledge communities are key platforms that provide wonderful tools for knowledge sharing for individuals. So, it is critically important for students and professionals to understand this concept and should be part of such communities both formally and informally.

The following section explains the unit objectives, definition of community of practice, and its assumption, and characteristics. It also discusses professional, discourse, and learning communities as well as a community of practice and social capital.

OBJECTIVES

After reading this unit, you would be able to:

1. Explain the community of practice

2. Explain different types of communities of practice and their purposes

3. Explain online communities of practice

4. Understand the benefits of a community of practice

2.1 COMMUNITY OF PRACTICE

The concept of community of practice exists since ancient time. However, in the recent past, Lave and Wenger (1991) introduced the notion, of a community of practice, while studying apprenticeship as a learning model. The concept is grounded in the principles of situated learning, a form of experiential learning. Later, Wenger (1998) expanded the concept and described the structure of a community of practice, which consisted of the following three dimensions:

1. Joint enterprise, is a shared understanding through members' interactions that binds them together and is continually renegotiated by its domain members.
2. Mutual engagement refers to how members establish norms and develop collaborative relationships through participation in a community to form a social entity.
3. Shared repertoire means the communal resources, experiences, stories, tools, ways of addressing recurring problems etc., produced as part of the community practice and are used in the pursuit of a joint enterprise (Wenger, 1998).

Several other scholars also define a community of practice. According to Wenger and Trayner (2015), communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. The community of practice is evolving concept. Still, there is a lack of consensus on the definition of the notion. The different interpretations of a community of practice make it challenging to apply the concept to get benefits that the group members of a community of practice may offer (Li et al., 2009).

2.1.1 Assumption of Communities of Practice
The communities of practice do not necessarily task-oriented, but they are learning communities in different settings (Lai, Pratt, Anderson, & Stigter, 2006). The communities of practice are based on certain assumptions that address how learning takes place between and/ among individuals members (Lai et al., 2006). Trentin (2002) summarizes the assumptions of a community of practice as follows:

1. Learning is fundamentally a social phenomenon.
2. Knowledge is integrated into the life of communities that share values, beliefs, languages, and ways of doing things.
3. The process of learning and the process of membership in a community of practice are inseparable.
4. Knowledge is inseparable from practice.
5. Empowerment creates the learning potential.

2.1.2 Characteristics of Communities of Practice

A community of practice should include the following four characteristics:

1. Practice is the unifying feature of the community.
2. Relationships that are grounded in information exchange and knowledge creation.
3. Membership ranges from novices to old-timers; and,
4. Shared learning, may also occur effectively at the boundaries/peripheries of the community (Lai et al., 2006).

There are many types of community of practices. They are typically defined as a function of some common interests such as:

- A profession such as engineering, law, or medicine
- A work-related function or process such as production, distribution, marking, sales, or customer service
- A recurring, nagging problem situated in a process or function
- A topic such as technology, knowledge retention, or innovation
- An industry such as automotive, banking, or healthcare (Dalkir, 2017)

The notion of a community of practice is closely linked with other related concepts such as professional communities, discourse communities, and learning communities. These concepts are quite helpful to comprehend the concept of community of practice (Wallace, 2007).

2.1.3 Professional Communities

The conceptualization of the professional community has gained considerable momentum in theoretical and empirical studies. Still, the concept is facing conceptual and methodological difficulties to define universal definition. The five core interconnected constructs, namely, (1) reflective dialogue, (2) feedback on instruction, (3) collaborative activity, (4) shared sense of purpose, and (5) a collective focus on student learning is quite helpful to explain the notion professional community (Lomos, Hofman, & Bosker, 2011). The most simply, a professional community is a group of people who share professional or occupational responsibilities (Wallace, 2007).

Goode (1957) explains the following seven characteristics that make the profession a community:

1. Its members are bound by a sense of identity.
2. Once in it, few leave, so it is a terminal or continuing status for the most part.
3. Its members share values in common.
4. Its role definitions vis-à-vis both members and non-members are agreed upon and are the same for all members.

5. Within the areas of communal action, there is a common language, which is understood only partially by outsiders.
6. The community has power over its members.
7. Though it does not produce the next generation biologically, it does so socially through its control over the selection of professional trainees, and through an adult socialization process.

2.1.4 Discourse Communities

The notion of discourse community has been widely discussed and reported from different contexts. According to Porter (1986), a discourse community is a group of individuals bound by a common interest who communicate through approved channels and whose discourse is regulated. The membership of a discourse community is usually a matter of choice; however, members actively share goals and communicate with other members to pursue those goals. Moreover, discussions in such communities typically focus on the use and analysis of written communication (Borg, 2003).

Swales (1990) outlines six essential characteristics of a discourse community. These include (1) common public goals, (2) methods of communicating among members, (3) participatory communication methods (4) genres that define the group, (5) lexis; and (6) a standard of knowledge needed for membership. A society of stamp collectors scattered across the globe is an example of a discourse community. The individual members never gather face-to-face but rather use a newsletter, an example of the genre, to achieve the goals of the group (Borg, 2003). From the higher educational perspective, the examples of discourse community may be: (1) those who read and/or contribute to an academic journal, and (2) the alumni body of a university.

2.1.5 Learning Communities

During the1960s, the concept of learning communities was reported in the education literature and received considerable attention in the business literature at the beginning of the twenty-first century. The literature on learning communities focuses on the transformation of formal education, the roles and functions of professional associations, and the creation and nurturing of online communities (Wallace, 2007).

Learning communities are referred to as groups of people engaged in intellectual interaction for learning. Most people are interested in learning communities because: (1) learning communities fit into a changing philosophy of knowledge, (2) learning communities fit with what research tells us about learning, and (3) learning communities work (Cross, 1998).

2.1.6 Online Communities

In today's hyper-connected world, public and private sector organizations are continually seeking cost-effective ways to leverage know-how for problem-solving and competitive advantage. One of the most powerful ways they can add value is to provide an online space for staff and partners to interact and engage with each other, ask and answer questions, share relevant content, and solve problems in real-time. These online communities can be one of an organization's most powerful assets. If intentionally designed, they have the potential to positively impact a range of strategic objectives, foster collaboration and spark innovation.

In organizations, people are often doing similar work yet remain unaware of one another's skills, expertise, successes, and failures. People who can benefit from each other's experiences are often isolated, as the formal structure that ensures accountability for the execution of the work often inhibits ad-hoc and informal/ unstructured exchanges of knowledge and ideas with colleagues and partners grappling with similar issues.

In recent years, the technology for building and engaging in these communities has become easier and more intuitive to use. Thanks to the widespread use of social media, most staff and partners are already equipped to participate in online communities. Communities provide a safe space for brainstorming that links idea generation and problem-solving to out-of-the-box thinking, fueling new and innovative approaches. They rely on three key elements: people, (shared) focus and practice.

Well-purposed and skillfully led online communities can become venues for instantly sharing ideas and know-how. The immediacy of communication fosters the creation of an evolving pool of 'living knowledge. The members of the community transform this living knowledge into 'living action', and in turn into 'living solutions'. Research also suggests that effective use of online communities reduces the time required both in searching for information and collaborating on tasks. From an international organization perspective, some key benefits of online communities of practice are:

- Sustainable, cost-effective mobilization of staff and partners around the world.
- Collaboration across different offices, technical sectors and jobs.
- Quick access to evidence and experiences to help inform current and future work.
- Quick access to practical and innovative solutions.
- Safe forums for constructive critiques and testing of 'new and emerging practices.
- Environment for nourishing individual and collective learning.
- Prevention of "reinventing the wheel" through the sharing of knowledge and experiences (Arivananthan, 2015).

2.2 COMMUNITY OF PRACTICE AND SOCIAL CAPITAL

Communities of practice support organizations to develop human capital. Specifically, organizations develop communities of practice to achieve the following benefits:
- Building loyalty and commitment on the part of stakeholders
- Promoting innovation through better sharing of best practices
- Improving the efficiency of processes
- Generating greater revenue and revenue growth
- Decreasing employee turnover and attrition (Dalkir, 2017).

2.3 SELF-ASSESSMENT QUESTIONS

1. What are the key challenges to developing a unanimously agreed definition of the community of practice?

2. Is it essential to become a member of a community of practice for lifelong learning? If yes, how?

3. Does the community of practice support information and knowledge share among individuals? If yes, how?

4. How do learning communities create new knowledge?

5. How does the professional community of practice transfer knowledge among its members?

6. Do you think the community of practice can work well as an effective management tool for improving an organization's competitiveness?

7. How online communities of practice is useful from the Pakistani universities' perspective?

2.4 ACTIVITIES

1. In the digital age, every individual is a part of one or more communities formally or informally to collaborate and cooperate to share information and knowledge. Discuss how and what types of information and knowledge your class fellows and teachers share in the communities of practice in a university setting.

2. Explore an online/social media-based community of practice in a higher education institute. By doing a content analysis of the members' posts, evaluate how and to what extent the community is useful for their members.

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ORGANIZATIONAL LEARNING AND LEARNING ORGANIZATIONS

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CONTENTS

INTRODUCTION

The rapid changes in contemporary society due to the advances in information and communication technologies and globalization have compelled organizations to recognize knowledge as a strategic resource. To sustain in the ruthless economy, organizations need different types of knowledge to solve multifaceted problems. This assumption led to the concept of learning organization (Jashapara, 2004). To conceptualize the notion of organisational learning, it is important to introduce the concept of learning. There is no universally agreed-upon consensus on the definition of learning, but one simple way of putting it is that learning is about how we change. After learning we are different in some way from the way we were before. In a learning organization, four types of learning are vital. These are learning:

1. About things or knowledge,
2. To do things or skills, abilities, competencies,
3. To become ourselves, to achieve our full potential or personal development, and,
4. To achieve things together or through collaborative enquiry (Pedler, 1995).

This unit explains organizational learning and approaches to organizational learning. Further, it describes learning organization, its key dimensions, characteristics, and different types of learning in learning organizations. The discussion on organizational learning versus learning organization also supports understanding the two key concepts.

OBJECTIVES

After reading this unit, you should be able to:

- Explain organizational learning.

- Explain learning organization.

- Differentiate between organizational learning and learning organization.

3.1 ORGANIZATIONAL LEARNING

Organizational learning facilitates organizations to transform individual knowledge into organizational knowledge (Basten & Hamann, 2018). Organizational learning is referred to learning what worked and what did not work from the past and effectively transferring this experientially learned knowledge to present-day and future knowledge workers. So, it can be inferred that organizational learning is a process through which an organization learn from its successes (best practices and innovations) and its failures (lessons learned) over time. To learn from the past and to be innovative in future, there should be a mechanism to leverage the collective experience of an organization, and the ability to obtain help in reusing or putting this collective knowledge into action so each can better performs its job (Dalkir, 2017). According to Chiva, Ghauri and Alegre (2014), organizational learning may be defined as the process through which organizations change or modify their mental models, rules, processes or knowledge, maintaining or improving their performance.

Organizations learn at three levels (Figure 3.1): (1) individually, through its employees; collectively, through (2) teams; and institutionally, (3) at the organizational level (DuBrin 2005, 346; Janus, 2016).
1. At the individual level, learning takes place through intuition and interpretation of actions and events in the organization. These can trigger further action, such as course-correcting measures in case of non-performance.
2. At the group or team level, learning has an integrative dimension. For example, joint learning can result in a common understanding among team members about a work-related challenge. Dialogue and collective thinking, including collaborations between team members, can generate a coordinated set of actions.
3. At the organizational level, learning leads to the institutionalization of actions. If deemed successful, the one-time actions developed at the group level can be turned into regular, standardized mechanisms through which the organization addresses reoccurring challenges. At this level, learning becomes fully embedded in the organization.
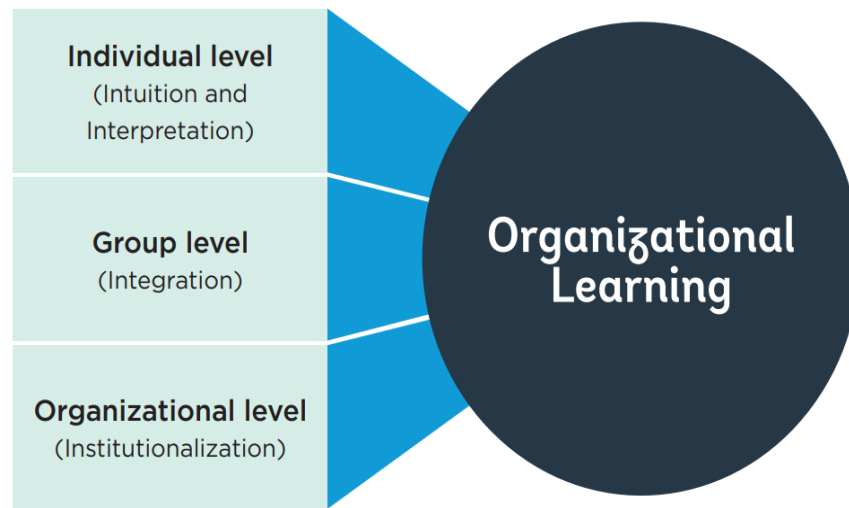
Figure 3.1 How Organizations Learn

3.1.1 Approaches to Organizational Learning

For organizational learning, different approaches are adopted to capture and manage the strategically significant resources of organizations. Different organizational learning approaches have been reported in the extensive literature. In a recent study, Basten and Haamann (2018) reports 18 organizational learning approaches across three domains: (1) people-based organizational learning approaches, (2) process-based organizational learning approaches, and (3) technology-based organizational learning approaches. A brief description of the approaches is as follows:

- People-based organizational learning includes seven approaches, namely, chief knowledge officer, dyadic relationships, events for informal interactions, job rotations, knowledge broker, knowledge manager, and skills management.
- Process-based organizational learning contains nine approaches as action learning, communities of practice, cross-functional teams, experience factory, leaving expert debriefing, postmortem evaluations, project briefings, research and development, and training.
- Technology-based organizational learning approaches are referred to as knowledge repositories and virtual worlds.

3.2 LEARNING ORGANIZATION

An organization that possesses the practices, systems, and culture that actively promotes sharing of experiences and lessons learned to encourage quality

performance and continuous improvement (Dalkir, 2017). A learning organization is an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behaviour to reflect new knowledge and insights. Moreover, learning organizations are mainly based on five main activities:

1. systematic problem-solving,
2. experimentation,
3. learning from past experiences and mistakes,
4. learning from others, transferring, and,
5. sharing knowledge across the organization (Garvin, 1993).

For conceptualization of the notion, Senge (1990) outlines five key dimensions that a learning organization should have. The attributes are: (1) mental models, (2) shared vision, (3) personal mastery, (4) team learning, and (5) systems thinking. A brief description of the five dimensions is as follows:

- Personal mastery is regarded as developing our capacity to clarify what is important to us in terms of our vision and purpose.
- Team learning is deemed to develop our capacity for conversation and balance between dialogue and discussion.
- Systems thinking is seen as developing our capacity for putting the pieces together and seeing wholes rather than disparate parts.
- A mental model is our capacity to reflect on our internal pictures. This discipline involves balancing our skills of inquiry and advocacy as well as understanding how our mental models influence our actions.
- A shared vision is concerned with building a sense of commitment in a group based on what they would like to create (Jashapara, 2004).

In the contemporary competitive business world, organizations should convert themselves into learning organizations. To create a true learning organization, the following four aspects should be combined:

1. Learning at work
2. Organizational learning
3. Developing a learning climate
4. Creating learning structures

Only those organizations that implement all of the aspects should be called learning organizations, and those organizations that have implemented only one aspect should be called "partial learning organizations (Ortenblad, 2004).

3.2.1 Characteristics of the Learning Organization
To be able to learn, an organization should document key resources like best practices, innovations, lessons learned from failures and access to the individual

through an organizational memory (Dalkir, 2017). A learning organization should exhibit the essential characteristics, for example:
1.   The individuals associated with an organization should be in the loop of continuous learning and development.
2.   Holistically, an organization should function in such a way that includes and integrates individual learning and development that leads to the self-development of the organization (Pedler, 1995).

3.3   TYPES OF LEARNING IN LEARNING ORGANIZATIONS

Learning is articulated in numerous ways (Pedler & Aspinwall, 1998; Ortenblad, 2004; Talbot, Stothard, Drobnjak, & McDowall, 2014; Argyris & Schon, 1978). According to Pedler and Aspinwall (1998), the following are the ways of learning:
1.   Learning about things (knowledge).
2.   Learning how to do things (skills, competencies, abilities).
3.   Learning to become oneself (personal development).
4.   Learning to achieve things together (collaborative enquiry and teamwork).

In addition, several researchers mentioned the following six approaches to learning:
1.   Individual learning
2.   Organizational learning
3.   Adaptive (single loop) learning
4.   Generative (double loop) learning
5.   Deutero learning
6.   Learning at work (Ortenblad, 2004; Talbot, Stothard, Drobnjak, & McDowall, 2014; Argyris & Schon, 1978)

3.3.1 Individual Learning
From an organizational perspective, learning is explained in the terms of detection and correction of an error in practice (Wallace, 2007). In a small organization, comprising a few members, organizational learning could be considered synonymous with individual learning. However, as organizations grow, a clear distinction develops between individual and organizational learning. ndividual learning theories come from various branches of behaviourism and cognitive psychology (Jashapara, 2004). Individual learning is referred to a process through which an individual improves their knowledge. The learning organization is predicated on individual learning, where learning is a culmination and a consequence of the actions of individuals in an organization. The foundation of action learning concerns the integration and synchronization of thinking and doing,

as well as linking ideas with action. However, organisational culture is a key enabler for individual learning (Talbot, Stothard, Drobnjak, & McDowall, 2014).

3.3.2 Organizational Learning
In organizational learning, individual learning plays a key role in organizational performance. So, it is critically important to add individual knowledge into the organization's memory (Talbot, Stothard, Drobnjak, & McDowall, 2014). For organizational learning, there is a need to be aware of different levels of learning, and the storing of knowledge in an organization, known as organizational memory. Organizational memory consists of standard operating procedures, routines, documents, manuals, and shared mental models. The stored knowledge is used in practice (Ortenblad, 2004).

3.3.3 Adaptive (single loop) Learning
Single-loop learning is a primarily individual process that may have definitive organizational benefits (Wallace, 2007). The single-loop learning refers to a situation in which members of an organization respond to changes in the internal and external environments of the organization by detecting errors which they can correct to maintain the central features of organizational theory-in-use (Argyris & Schon, 1978).

3.3.4 Generative (double loop) Learning
Double-loop is used when all possible strategies could not find a solution to leverage the single-loop technique. In double-loop learning, the need for error correction generates reconsideration of the fundamental norms of the organization and strategies for action. There are two feedback loops. The first one links the error or problem to the selection and implementation of actions and strategies. The second one links the error or problem to the reconsideration of organizational norms (Wallace, 2007).

3.3.5 Deutero Learning
Higher-order learning in organizations is conceptualized as deutero-learning. Bateson (2018) coined the term deutero-learning (triple-loop learning), also known as the process of learning to learn. Deutero-learning also encompasses both single-learning and double-loop learning. Deutero-learning learning focuses on the ability to effectively utilize single and double-loop learning. (Visser, 2007). In deutero-learning, individuals learn about previous contexts for learning. They reflect on and require previous contexts for learning. They reflect on and inquire into previous episodes of organizational learning or failure to learn (Argyris & Schon, 1978). Figure 3.2 explains the modes of single-loop learning, double-loop learning and deutero-learning (Eilertsen & London, 2005).
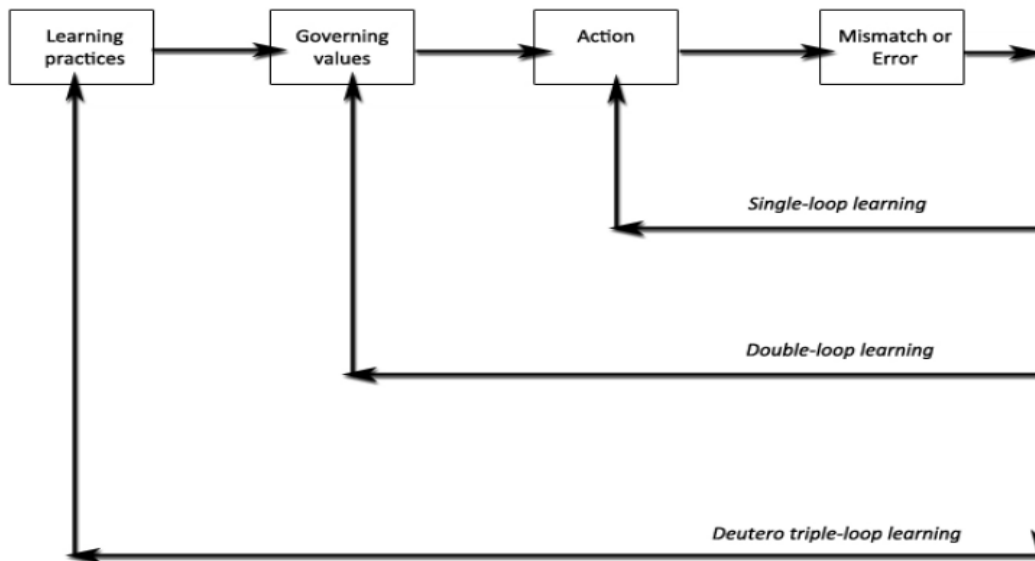
Figure 3.2: Modes of learning
Source: (Eilertsen & London, 2005)

3.3.6 Learning at Work

Instead of formal learning, individuals learn during job, known as on-the-job learning. This aspect of the learning organization views learning and knowledge as context-dependent. In contrast, formal learning (courses)plays a limited role in learning because it is difficult to apply learning from formal education to work practices (Ortenblad, 2004).

3.4 ORGANIZATIONAL LEARNING VERSUS LEARNING ORGANIZATION

Despite the clear distinction between organizational learning and the learning organization; however, there is also confusion between the two terms learning' as some authors use the terms synonymously and interchangeably (Jashapara, 2004). Ortenblad (2001) clarifies that organizational learning is existing processes while learning organization is an ideal form of organization. More specifically, a learning organization is a form of the organization while organizational learning is an activity or process (of learning) in organizations, and that learning organization needs efforts while organizational learning exists without any efforts. According to Jashapara (2004), a useful distinction is to consider organizational learning as the processes or activities in an organization whereas a learning organization can be considered as the end state. Some major distinctions between organizational learning and the learning organization are presented in Table 3.1.

Table 3.1: Distinctions between organizational learning and the learning organization

Organizational learning	Learning organization
Means	End
Process or activity	Idealized form
Attainable	Easily lost due to changes
Descriptive research	Prescriptive research
Inductive	Deductive (normative)
Academic orientation	Practitioner and consultancy orientation
Predominantly qualitative research	Predominantly quantitative research (little empirical evidence so far)
Theoretical orientation	Action orientation

Source: (Jashapara, 2004)

Both the concepts of organizational learning and learning organization highlight the importance of learning for organizations. Learning, being an intrinsic attribute of individuals, is present in any organization due to its human system, so it is an inevitable element of organizational life. Therefore, it is our conviction that whatever the future of the expressions 'organizational learning' and 'learning organization', the importance of learning (and the need to promote it) is now a recognized and central issue in organizations. The learning organization could be out of fashion and thus managers' efforts in following the best-known learning organization models to transform their organizations into one of them may also be out of date, but they know the importance of promoting learning, and learning to ensure organizational success is not a question of fashion but a question of survival in a global world (Rebelo & Gomes, 2008).

3.5 SELF-ASSESSMENT QUESTIONS

1. Outline the major benefits of organization learning from a university library perspective.

2. What are the key differences between organizational learning and learning organization?

3. Compare and contrast organization learning and the learning organization in a university setting.

4. What is the most appropriate approach for an organization learning to adapt in a university library?

5. How can a shared vision of a learning organization be developed?

3.6 ACTIVITIES

Visit a nearby university library and asks questions to library professionals to enquire the following three questions:
- What sort of learning is happening in the library?
- Who is learning about what?
- As a whole library, what are they learning from the actions they are taking?

Prepare a short report based on the data analysis collected through the above three questions and share the report with the course tutor for feedback.

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INTELLECTUAL CAPITAL AND KNOWLEDGE ECONOMY

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CONTENTS

INTRODUCTION

Intellectual capital is a multi-disciplinary concept. The understanding of the notion varies across different disciplines (Huang, Luther, & Tayles, 2007). Intellectual capital is a relatively new academic endeavour. It is a practitioner-created concept and has its origins in consultancy and industry (Jashapara, 2004). Accordingly, it is an essential source of sustainable competitive advantage and is also leveraged to create wealth in organizations (Stewart, 1997). So, this unit discusses the different types of capital, for example, intellectual capital, human capital, structural capital, and customer capital. Moreover, a brief discussion on the knowledge economy would shed light on the significance of knowledge in the competitive and ruthless economy.

OBJECTIVES

After reading this unit, you should be able to:

1. Understand the differing conceptions of intellectual capital and knowledge economy.

2. Comprehend different classifications of intellectual capital.

3. Apply the concepts of intellectual capital and the knowledge economy in practice.

4.1 INTELLECTUAL CAPITAL

Several researchers have defined and classified intellectual capital in different settings. The Organization for Economic Co-operation and Development (1999) defines intellectual capital as the economic value of organizational (structural) capital and human capital. According to Bontis, Dragonetti, Jacobsen, and Roos (1999), intellectual capital is a collection of intangible assets and flows that contribute to the company's value-creating process. Some authors refer to intellectual capital as the knowledge and knowing capability of a social collectivity, such as an organization, intellectual community, or professional practice (Nahapiet & Ghoshal, 1998). From Svieby's (1997) point of view, intellectual capital is equal to the difference between the market value of a publicly held company and its official net book value, the value of its intangible assets.

Intellectual capital is a dynamic entity and is closely linked with knowledge management (Jashapara, 2004). Traditionally, intellectual capital is categorized into three types:
1. Human capital
2. Structural capital
3. Customer capital/relational capital (Bontis, 1998).

4.1.1 Human Capital

Human capital is the most important component of intellectual capital. It is defined as the combined knowledge, skill, innovativeness, and ability of a company's employees to meet a specific task at hand. It also includes the company's values, culture, and philosophy (Bontis, 2001). It refers to the tacit knowledge embedded in the minds of employees (Hsu & Mykytyn Jr., 2011). At an individual level, human capital is the combination of four components, namely, (1) genetic inheritance, (2) education, (3) experience, and (4) attitudes about life and business (Hudson, 1993). Ulrich (1998) proposed a simple and practical definition of human capital. It is the product of key competence and commitment. Competence is explained with two facets:
1. Competencies must align with business strategy; and,
2. Competencies need to be generated through more than one mechanism, such as buy, build, borrow, bounce and bind. Commitment reflects how employees relate to each other and feel about a firm. An organization can increase competence using three techniques, for example, reduce demands, increase resources, and turn demands into resources.

Human capital is one of the important dimesions of organizational intellectual capital. Without human capital, an organization would not be able to make progress. So, it is important to know what ingredients support the development of human capital. Khadir-Poggi, Keating, and Chandler (2014) have indicated the following key elements of human capital:
- Individual tacit knowledge

- Intelligence
- Skills
- Expertise
- Learning capability
- Competence
- Leadership capability of top management
- Intellectual capability
- Innovativeness
- Creativity
- Attitude
- Motivation

4.1.2 Structural Capital

Structural capital means hardware, software, databases, organizational structure, patents, trademarks, and everything else of organizational capability that supports those employees' productivity. More specifically, everything that gets left behind at offices when employees go home (Bontis, 2001). In other words, the knowledge embedded within the routines of an organization involves organizational structure, culture, and technology. Structure capital includes a technological component and architectural competencies (Hsu & Mykytyn, 2011). So, it is critically important to know what key factors that contribute to organizational structural capital. Khadir-Poggi, Keating, and Chandler (2014) enlisted the elements of structural capital as follows:

- Organizational routines
- Risk assessment methods
- Information database
- Communication systems
- Management
- Legal structure
- Manual systems
- Attitude
- Research and development
- Proprietary software
- Corporate culture, values, and policies
- Relationships with external organizations

4.1.3 Customer Capital

Knowledge of marketing channels and customer relationships is the main theme of customer capital. More specifically, it is the relationship between organizations and their customers (Bontis, 1998). According to Jashapara (2004), customer capital is the value of organizational relationships with customers including their intangible loyalty. The key attributes of customer capital include the knowledge embedded in customers, suppliers, government or related industry associations (Bontis, 1998).

Intellectual capital includes human, structural, and customer capital. In the extant literature, there can be confusion between intellectual capital and intangible assets. However, intellectual capital is a subset of the overall intangible base of an organization. On the whole, intellectual capital is a dynamic entity and is closely linked with the processes and practices of knowledge management (Jashapara, 2004). Roos, Roos, Edvinsson, and Dragonetti (1997) proposed a useful map of intellectual capital that makes a distinction between efforts focused on a strategic perspective or a measurement perspective (Figure 4.1).
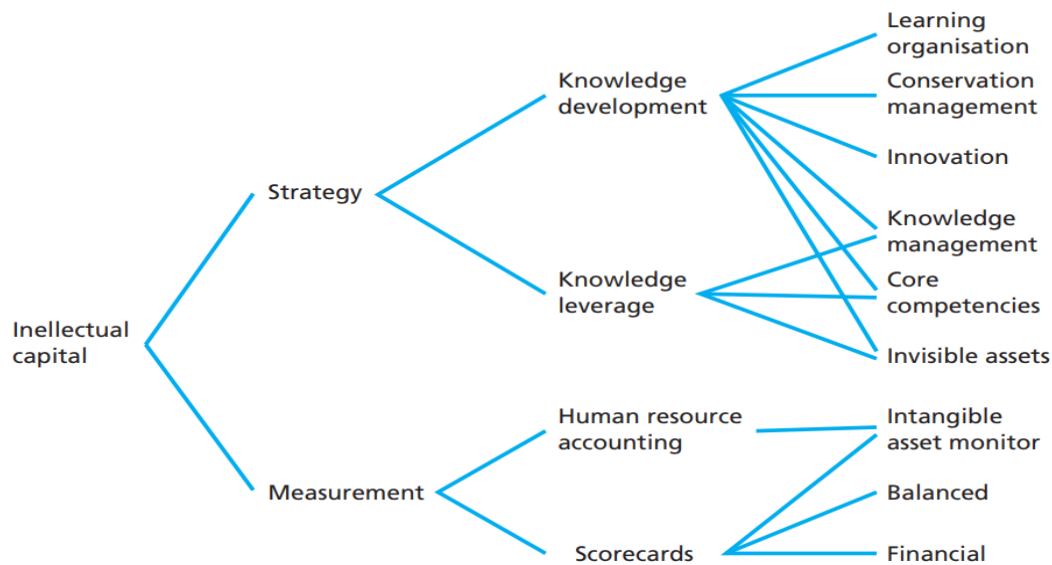

Figure 4.1: Conceptual roots of intellectual capital
Source: (Roos, Roos, Edvinsson, & Dragonetti, 1997)

4.2 KNOWLEDGE-ECONOMY

The knowledge economy is a broader concept. The complexity is due to the lack of a unanimously accepted definition of knowledge. So, there is no single definition that could capture all aspects of the knowledge economy. Simply, a knowledge economy is an economy based primarily on knowledge rather than other factors of production such as labour or technology (Jashapara, 2004). Brinkley (2006) explains knowledge economy is what you get when firms bring together powerful computers and well-educated minds to create wealth. From a broader perspective, the knowledge economy is production and services based on knowledge-intensive activities that contribute to an accelerated pace of technical and scientific advance, as well as rapid obsolescence. The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources (Powell & Snellman, 2004). Wallace (2007) defines the knowledge

economy as an economy in which growth is thought to be dependent on the effective acquisition, dissemination, and use of information, rather than the traditional means of production.

4.3 SELF-ASSESSMENT QUESTIONS

1. Do you think intellectual capital is a critical factor in future growth and prosperity? Discuss critically from the Pakistani perspective.

2. Why have researchers and practitioners developed different categories of intellectual capital?

3. What are the issues associated with human, structural, and customer capital within an organization?

4.4 ACTIVITIES
1. Search online databases, for example, Web of Science, Scopus, Emerald, etc. and download research articles. By reviewing the literature, define and explain intellectual capital and the knowledge economy in the higher education context.
2. Use concept analysis to clarify intellectual capital versus physical assets.
3. Review the related literature to enlist the most cited classification schemas of intellectual capital.
4. To what extent researchers have addressed the status of the knowledge economy in Pakistan?

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Unit–5

KNOWLEDGE SHARING

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45

CONTENTS

INTRODUCTION

Once knowledge is identified and codified, knowledge should be shared throughout the organization (Dalkir, 2017). So, knowledge sharing is critical to organizations that intend to leverage their knowledge to achieve competitive advantage. A major focus of knowledge sharing is on individuals, groups, and organization levels that can communicate knowledge to other individuals, groups, and organizations (King & He, 2011). Another key consideration of knowledge sharing is to share knowledge among team members in more intended ways (Glassop, 2002). Mainly, knowledge management systems act as enablers of knowledge sharing in an organization (King & He, 2011).

Knowledge sharing is one of the processes of knowledge management. It is also considered the foundation of learning and research in educational institutions (Kumar, 2005). Sharing knowledge is beneficial both for individual and organizational performances and enhances quality and innovation in the higher education domain (Zaqout & Abbas, 2012; Arif & Kanwal, 2016; Charband & Navimipour, 2018). Knowledge is also the main source of creative thinking, therefore, sharing knowledge increases an individual's critical and creative thinking (Amin, Basri, Hassan, & Rehman 2011).

Knowledge sharing is critically important for all types of organizations. Janus (2016) highlights that organizations engage in knowledge sharing for the following three principal reasons:
1. Become better at what they do by producing higher-quality output or services and overcoming obstacles faster
2. Make themselves more independent from select staff members by equipping more employees with critical knowledge
3. Replicate and scale up successes and avoid repeating failures.

Knowledge sharing can improve all levels of an organization's operation. Internally, it can help develop collaboration and innovation among staff members and avoid the loss of mission-critical know-how. Domestically, it can equip local partners with critical knowledge and solutions, including for policy implementation. Internationally, it can inspire new solutions and development pathways that stimulate change and reforms (Janus, 2016).

Keeping in view the significance of knowledge assets, this unit explains knowledge sharing, knowledge sharing versus knowledge hoarding, knowledge sharing versus knowledge transfer, and knowledge sharing models and theories. The last section also discusses the factors affecting knowledge sharing, and the strategic benefits of knowledge sharing for contemporary organizations.

OBJECTIVES

After reading this unit, you would be able to:

- Understand knowledge sharing and its importance from an organizational perspective.

- How knowledge sharing is different from knowledge hoarding and knowledge transfer?

- Know about knowledge-sharing models and theories in general and from higher education perspective in specific.

- Identify critical factors that impact effective knowledge sharing.

- Explain knowledge-sharing benefits

5.1 KNOWLEDGE SHARING

In knowledge management literature, several authors define knowledge sharing in different contexts. According to King and He (2011), knowledge sharing is the exchange of knowledge between and among individuals, and within and among teams, organizational units, and organizations. This exchange may be focused or unfocused, but it usually does not have a clear a priori single objective. From a higher education perspective, Wei, Choy, Chew, and Yen (2012) have defined knowledge sharing comprehensively. According to them, knowledge sharing is the dissemination or exchange of explicit and tacit knowledge (ideas, experiences or even skills) from one individual to another individual student or group of students. Thus, it requires the student or [a] group of students to interact with each other either through face-to-face or non-physical contact means.

In an organizational environment, formal knowledge-sharing is encouraged and sometimes it is mandatory in formal meetings, knowledge-sharing events, team retreats, exit interviews and knowledge-sharing events, etc. However, Knowledge sharing often happens informally. The 'water cooler conversation' is not planned but can be hugely helpful in providing a way for colleagues to quickly update one another or get advice on a current challenge to be addressed. Although informal knowledge sharing is not planned, organizations have long known that it can be nurtured through thoughtful space planning (Janusm, 2016).

Such planning is especially common in leading technology and research organizations. Some use open-space office layouts or furnish special meeting zones with tables, sofas, flip charts, whiteboards or web-enabled smart boards. Others count spaces designed for relaxation and light recreation as conducive to knowledge sharing. A ping-pong table may not be high on the procurement list of a public sector organization but finding ways to foster impromptu interactions between people will pay dividends (Janusm, 2016).

5.2 KNOWLEDGE SHARING VERSUS KNOWLEDGE HOARDING

It is often said that sharing is caring. In contrast to knowledge sharing, knowledge hoarding is occurred when an employee controls critical knowledge and does not allow anyone except him/her to obtain it to protect his/her expertise, constitutes a threat to the continuity of the organization's knowledge base and productivity (Bilginoğlu, 2019). Knowledge in isolation has no meaningful value; however, knowledge is assigned value only when it is exchanged between or among actors

(Wallace, 2007). Despite that, there are a lot of issues that confront knowledge sharing. Among the issues, hoarding knowledge is a key challenge for the effective and efficient sharing of knowledge.

5.3 KNOWLEDGE SHARING VERSUS KNOWLEDGE TRANSFER

Both the terms, knowledge sharing, and knowledge transfer are sometimes confusingly used interchangeably. A major distinction between knowledge sharing and knowledge transfer is that transfer implies focus, a clear objective and unidirectional, while knowledge may be shared in unintended ways, multi-directionally and without a single specific objective. In a more precise way, knowledge transfer is referred to as the focused, objective-seeking communication of knowledge between individuals, groups, or organizations such that the recipient of knowledge either (a) receives the knowledge, (b) has a cognitive understanding of it, (c) can apply the knowledge, or (d) applies the knowledge (King & He, 2011).

5.4 KNOWLEDGE-SHARING MODELS AND THEORIES

In the knowledge management domain, several models and theories explain how knowledge is shared effectively between/among actors. Among the most prominent knowledge-sharing models, the socialization, externalization, combination, and internalization (SECI) model is the widely used model that encompasses how explicit and tacit knowledge interact to create new knowledge. The SECI model consists of four stages; namely, (1) socialization (from tacit knowledge to tacit knowledge), (2) externalization (from tacit knowledge to explicit knowledge), (3) combination (from explicit knowledge to explicit knowledge), and (4) internalization (from explicit knowledge to tacit knowledge), to create new knowledge through a continuous spiral between tacit and explicit knowledge. Socialization describes how individuals share tacit knowledge, for example, experience, skills, etc., while externalization explains how tacit knowledge is converted into explicit knowledge. The combination is referred to a process of systemizing concepts into a knowledge system. This mode of knowledge conversion involves combining different bodies of explicit knowledge. Internalization is a process of embodying explicit knowledge into tacit knowledge (Nonaka & Takeuchi,1995). Figure 5.1 explains the SECI model.
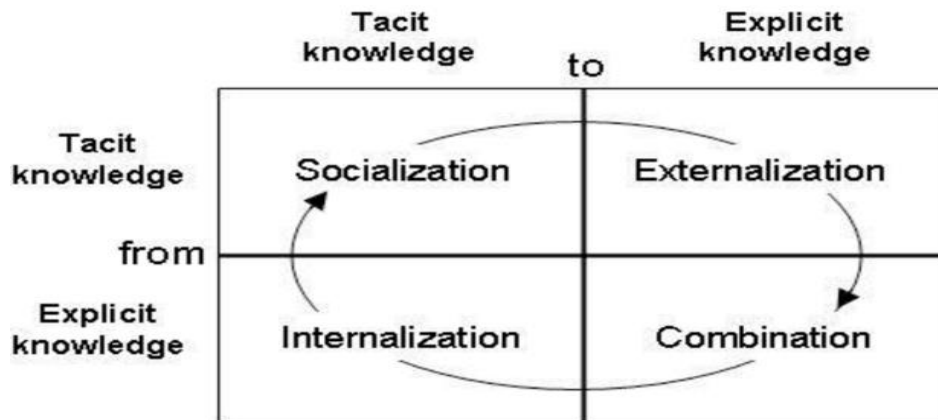
Figure 5.1: SECI model (Nonaka & Takeuchi,1995)

In Pakistan, Lodhi (2005) developed a cultural-based knowledge-sharing model that consists of the communication channel, individual attitude, group attitude, and value. This model addresses knowledge sharing among academics and is sketched in Figure 5.2.
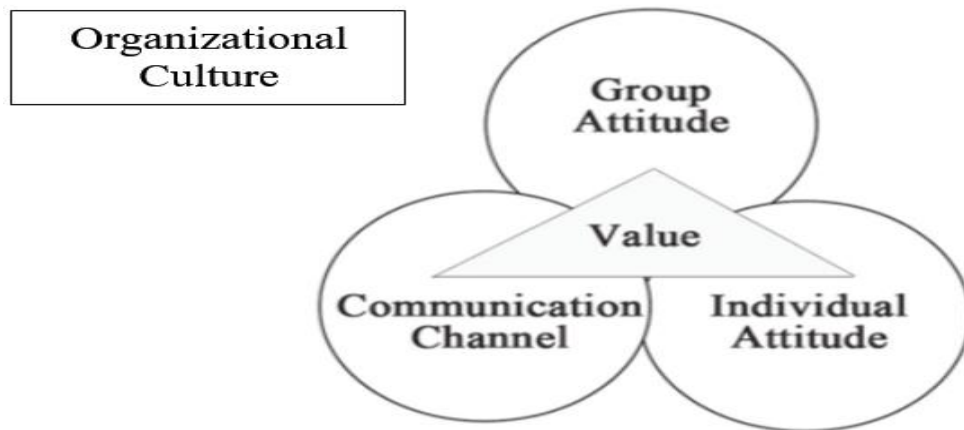
Figure 5.2: Cultural-based knowledge-sharing Model in higher education institutions (Lodhi, 2005)

5.5 FACTORS/BARRIERS AFFECT KNOWLEDGE SHARING

Several key factors should be considered for effective knowledge sharing among individuals. actors such as economic, behavioural, and social should be focused on while motivating individuals to contribute their most valuable personally held knowledge to others who they may not even know, as in contributing to a

knowledge management system. If the issues are addressed accordingly sharing knowledge among individuals is increased (King & He, 2011). More specifically some other factors affect knowledge sharing among individuals, for example, (1)individual factors such as personality, motivational factors, trust, skilled and qualified workforce, training, collaboration and teamwork, (2) technological factors such as IT infrastructure, technical support, reluctance to use technology, and (3) organizational factors, such as culture, human resource management practices, job security, leadership, supportive organizational policies, knowledge management policies and strategies, and rewards (Kanwal, Nunes, & Arif, 2019).

To improve the overall effectiveness of knowledge-sharing practices, Riege (2005) identified three main categories of knowledge-sharing barriers, namely, (1) individual barriers, (2) organisational barriers, and (3) technology barriers. The details of the barriers are as follows:

5.5.1 Individual Barriers
The core philosophy of knowledge management is based on the right knowledge from the right people to the right people at the right time being one of the biggest challenges in knowledge sharing. At the individual level, some several factors/ barriers should be considered, for example:
1. General lack of time to share knowledge, and time to identify colleagues in need of specific knowledge.
2. Apprehension of fear that sharing may reduce or jeopardize people's job security.
3. Low awareness and realization of the value and benefit of possessed knowledge to others.
4. Dominance in sharing explicit over tacit knowledge such as know-how and experience requires hands-on learning, observation, dialogue, and interactive problem-solving.
5. Use of strong hierarchy, position-based status, and formal power.
6. Insufficient capture, evaluation, feedback, communication, and tolerance of past mistakes would enhance individual and organisational learning effects.
7. Differences in experience levels.
8. Lack of contact time and interaction between knowledge sources and recipients.
9. Poor verbal/written communication and interpersonal skills.
10. Age differences
11. Gender differences
12. Lack of social network
13. Differences in education levels

14. Taking ownership of intellectual property due to fear of not receiving just recognition and accreditation from managers and colleagues
15. Lack of trust in people because they may misuse knowledge or take unjust credit for it
16. Lack of trust in the accuracy and credibility of knowledge due to the source
17. Differences in national culture or ethnic background; and values and beliefs associated with it (language is part of this) (Riege, 2005).

5.5.2 Organizational Barriers
From an organisational context, one of the key issues of sharing knowledge is to create a conducive working environment. Riege (2005) explored the following organizational barriers:
1. Integration of knowledge management strategy and sharing initiatives into the company's goals and strategic approach is missing or unclear.
2. Lack of leadership and managerial direction in terms of clearly communicating the benefits and values of knowledge-sharing practices.
3. Shortage of formal and informal spaces to share, reflect and generate (new) knowledge.
4. Lack of transparent rewards and recognition systems that would motivate people to share more of their knowledge.
5. The existing corporate culture does not provide sufficient support for sharing practices.
6. Knowledge retention of highly skilled and experienced staff is not a high priority.
7. Shortage of appropriate infrastructure supporting sharing practices.
8. Deficiency of company resources that would provide adequate sharing opportunities.
9. External competitiveness within business units or functional areas and between subsidiaries can be high (e.g., not invented here syndrome).
10. Communication and knowledge flows are restricted in certain directions (e.g., top-down).
11. The physical work environment and layout of work areas restrict effective sharing practices.
12. Internal competitiveness within business units, functional areas, and subsidiaries can be high.
13. Hierarchical organisational structure inhibits or slows down most sharing practices.
14. The size of business units often is not small enough and unmanageable to enhance contact and facilitate ease of sharing.

5.5.3   Technology Barriers
In the digital age, the role of technology is critically important for knowledge sharing. Several technological factors should be considered, for example:
1.   Lack of integration of IT systems and processes impedes the way people do things.
2.   Lack of technical support (internal or external) and immediate maintenance of integrated.
3.   IT systems obstruct work routines and communication flows.
4.   Unrealistic expectations of employees as to what technology can and cannot do.
5.   Lack of compatibility between diverse IT systems and processes.
6.   A mismatch between individuals' need requirements and integrated IT systems and processes restricts sharing practices.
7.   Reluctance to use IT systems due to lack of familiarity and experience with them.
8.   Lack of training regarding employee familiarization with new IT systems and processes.
9.   Lack of communication and demonstration of all advantages of any new systems over existing ones (Riege, 2005).

In addition to the above-stated barriers, Janus (2016) highlights some typical constraints on knowledge sharing from an organizational perspective as follows:
- Budget. Knowledge exchange costs vary dramatically. A series of virtual dialogues can be quite inexpensive, whereas an elaborate study tour involving participants from across the country can be very costly.
- Time. People tend to underestimate the time it takes to plan and complete a knowledge exchange and the number of variables involved, including the level of complexity and the nature of the outcomes sought.
- Location and operating environment. Common contextual constraints include political transition, civil unrest, cultural and social norms, and language. It helps to be aware of all these when dealing with recipients and providers.
- Technology and planning resources. Technology and guidance tools can be enormously useful, but not everyone has the same level of access, familiarity, or ability to use them.
- People. People include everyone involved in the exchange. Common constraints revolve around availability, willingness to participate, number of participants, preparedness, staffing, familiarity with the subject matter or a technology, ability to take action, absorptive capacity, role in the organization, and travel.

Despite knowledge-sharing barriers, scholars and practitioners suggested ways to improve knowledge-sharing among individuals. One of the most effective ways your organization can unlock the benefits of knowledge sharing is when you embed

it within your culture. Here are seven ways to improve knowledge sharing across your organization (Starmind, 2022).
1.   Encourage and foster a knowledge-sharing culture
2.   Create spaces for knowledge sharing to happen
3.   Encourage knowledge-sharing activities
4.   Lead by example
5.   Have experts share their knowledge
6.   Formalize a knowledge management process
7.   Use the most effective knowledge-sharing tools

5.6 STRATEGIC BENEFITS OF KNOWLEDGE SHARING

Sharing knowledge is beneficial both for individual and organizational performances and enhances quality and innovation in the higher education domain (Zaqout & Abbas, 2012; Arif & Kanwal, 2016; Charband & Navimipour, 2018). In addition, there are strategic benefits of knowledge sharing. Some of the benefits are:
• Connecting professionals across platforms, across distances
• Standardizing professional practices
• Avoiding mistakes
• Leveraging the best practices
• Reducing time to access talent
• Building reputation
• Taking on stewardship for strategic capabilities

Although, as we have noted, knowledge sharing is more of an art than a science, its success depends on important technical considerations. Whatever knowledge-sharing you plan, start with listening to develop a sound understanding of the issues to be tackled and the objectives you are trying to reach. Only then can you develop an effective, participatory process to design and implement knowledge-sharing activities. If your constituents have been involved from the outset, they will own the process and are more likely to stand by its outcomes. Before starting a knowledge-sharing program, the following checklist should be considered.
• Do we have the right mindset for sharing: Are we listening before sharing?
• Do we systematically facilitate targeted knowledge-sharing activities at all levels of our organization?
• Do we provide venues and opportunities for informal knowledge sharing?
• Are we making systematic use of social media to complement our knowledge-sharing efforts?
• Do we have a platform that facilitates local or domestic brokering of knowledge?

- Are we using a comprehensive set of knowledge-sharing instruments and activities to design targeted and results-oriented knowledge-sharing programs?
- Do we have a process to manage the implementation of knowledge-sharing programs?
- Do we have a process to follow up knowledge sharing to ensure that solutions are adapted, scaled up, and replicated?
- Are we making systematic use of international partnerships, networks, and platforms to globally access and promote solutions (Janus, 2016)?

5.7 SELF-ASSESSMENT QUESTIONS

1. Do you think knowledge sharing is critically important in information centres and libraries?

2. How does knowledge hoarding impact the effective and efficient services of libraries and information recentres in the digital age?

3. How could you differentiate knowledge sharing from knowledge transfer from the library and information center's perspective?

4. Explain the SECI model from a university library perspective. Enumerate which types of knowledge are being shared using different media in such organizations.

5. What factors impact knowledge sharing among professionals in Pakistani university libraries?

5.8 ACTIVITIES

1. Visit a nearby university library or information centre and discuss with professionals how they share knowledge. And what types of knowledge do they share.

2. What is the impact of knowledge sharing on individual's and sorganisational performances?

3. Create a WhatsApp course group by adding your class fellows and course tutor for knowledge sharing during a semester. At the end of the semester, analyze the group chat data and enlist the types of knowledge shared among/between the group members. What is the impact of knowledge sharing among individuals? Explain with examples.

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KNOWLEDGE REPRESENTATION
AND CONTENT MANAGEMENT

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Reviewed by: Dr. Munazza Jabeen

CONTENTS

INTRODUCTION

Once knowledge is acquired from human sources or automatically extracted, it is then required to represent the knowledge in an ontology language (Davies, Fensel, & Van Harmelen, 2003). So, knowledge representation is a key concept that requires special attention to develop knowledge-based systems. Knowledge itself is multilayered and difficult to define. For sharing knowledge effectively among individuals, knowledge management systems should capture available knowledge in an organization. For effective knowledge sharing, knowledge representation is critically important in the competitive contemporary world. So, students should have theoretical know-how of the key concepts of knowledge representation and content management systems.

This unit covers knowledge representation, knowledge representation and cognition, knowledge representation and artificial intelligence, the key role of knowledge representation, data management, document management, content management, content management, content management systems.

OBJECTIVES

After reading this unit, you would be able to:

- Conceptualize the notion of knowledge representation.

- Explain the key role of knowledge representation in knowledge management systems.

- Explain content management.

- Types of content management systems, and tools for developing content management systems.

6.1 KNOWLEDGE REPRESENTATION

Knowledge representation is an interdisciplinary concept. It is primary a concern in three areas: (1) cognitive science, (2) artificial intelligence, and (3) design for World Wide Web. (Wallace, 2007). The notion of knowledge representation is one of the central and most familiar concepts in artificial intelligence (Davis, Shrobe, & Szolovits, 1993). The central task of knowledge representation is capturing the complexity of the real world (Davis, Shrobe, & Szolovits, 1993).

6.1.1 Knowledge Representation and Cognition
Cognitive science deals with the mind and its processes. In cognitive science, knowledge representation has primarily to do with how people form and use mental representations of knowledge. The concept and nature of mental representation have been explored from many points of view, resulting in many approaches to and models for understanding the mental representation of knowledge. There is no one model agreed upon by psychologists and cognitive scientists (Wallace, 2007).

6.1.2 Knowledge Representation and Artificial Intelligence
Artificial intelligence is a branch of computer science concerned with making computers behave like humans. It refers to the science that provides computers with the ability to solve problems not easily solved through algorithmic models (Becerra-Fernandez & Sabherwal, 2011). From an artificial intelligence perspective, knowledge representation is closely linked to reasoning (Wallace, 2007).

6.1.3 Key Role of Knowledge Representation
Knowledge is complex, multilayered, and difficult to define. Likewise, knowledge representation is an interdisciplinary concept and difficult to conceptualize. Students can comprehend the notion by focusing on the five distinct roles that it plays. Moreover, the roles offer a framework that is useful for characterizing a wide variety of representations, each accordingly leads to an interesting and different set of properties. The five roles of knowledge representation are:
- A knowledge representation is a surrogate.
- A knowledge representation is a set of ontological commitments.
- A knowledge representation is a fragmentary theory of intelligent reasoning.
- A knowledge representation is a medium for efficient computation.
- A knowledge representation is a medium of human expression (Davis, Shrobe, & Szolovits, 1993).

Knowledge representation as a surrogate

Fundamentally, knowledge representation is a surrogate, a substitute for the thing itself, that is used to enable an entity to determine consequences by thinking rather than acting (Davis, Shrobe, & Szolovits, 1993).

Knowledge representation as a set of ontological commitments

Using controlled vocabulary, ontologies serve as metadata schemas that support people and machines to communicate concisely (Maedche & Staab, 2001). The core aim of ontology is to share and reuse knowledge as well as describe semantically equivalent things. It is necessary to map elements of ontologies if one wants to process information across applications or domains (Sugumaran, 2016). Knowledge representation is a set of ontological commitments. All representations are imperfect approximations of reality, each approximation attending to some things and ignoring others (Davis, Shrobe, & Szolovits, 1993). So, it implies that representations should explain the implicit and explicit meanings of objects/ artefacts because the complexity of the natural world is overwhelming.

Knowledge representation as a fragmentary theory of intelligent reasoning

The third role comes about because the initial conception of a representation is typically motivated by some insight indicating how people reason intelligently or by some belief about what it means to reason intelligently at all. It conveys two distinct senses: (1) the representation typically incorporates only part of the insight or belief that motivated it and (2) this insight or belief is, in turn, only a part of the complex and multifaceted phenomenon of intelligent reasoning (Davis, Shrobe, & Szolovits, 1993). The core aim of knowledge management is to manage knowledge assets to share at the individual, group, and organisational levels. Therefore, this role should be dealt with consciously.

Knowledge representation as a medium for efficient computation

The fourth role provides insight into how a representation offers for organizing information to facilitate making the recommended inferences. From a purely mechanistic view, reasoning in machines is a computational process. Simply put, to use a representation, we must compute with it (Davis, Shrobe, & Szolovits, 1993).

Knowledge representation as a medium of human expression

The fifth role of knowledge representations is as a medium of expression and communication to express things about the world. So, the role should address the two key questions: (1) how well does the representation function as a medium of expression? and (2) how well does it function as a medium of communication? (Davis, Shrobe & Szolovits, 1993).

6.2 DATA MANAGEMENT, DOCUMENT MANAGEMENT, AND CONTENT MANAGEMENT

Some critics distinguish between data management, document management, and content management (Wallace, 2007).

6.2.1 Data Management

Data management is the process of ingesting, storing, organizing and maintaining the data created and collected by an organization (Rouse, 2019). A document management system helps businesses to create, track and store digitized documents. The system is used to classify, retain, and protect electronic information. In contrast, the content management system is used to create and manage various types of digital content besides documents in the traditional sense. For example, in addition to being used for PDFs, Word files or Excel files, a content management system could be used to manage things like images, web pages, records and flash files (Golubenko, 2018).

6.2.2 Content Management

Content management is an overall process of collecting, managing, and publishing content to any outlet (Boiko, 2001). More specifically, it is the process for collection, delivery, retrieval, governance, and overall management of information in any format. The term is typically used about administration of the digital content lifecycle, from creation to permanent storage or deletion. The contents may be an image, videos, audio, multimedia, and text (Rouse, 2017).

Dumitriu (2016) explains the concept of content management as the processes and workflows involved in organizing, categorizing and structuring information resources so that they can be stored, published and reused in multiple ways. A content management system is used to collect, manage, and publish content; it stores content either as components or whole documents, in such a way as to maintain the links between components. "Content" in this context generally refers to computer-based information such as the content of a website or a database. Content management is about making sure that content is relevant, up-to date, accurate, easily accessible and well-organized, so that quality information is delivered to the user.

Based on goals and organization structure, content management practices and processes can vary. Generally, there are seven stages of the content management lifecycle:
1. *Organization:* The first stage is where categories are created, taxonomies designed, and classification schemes developed.
2. *Creation:* Content is classified into architectural categories.

3. *Storage:* Content format and storage decisions are made based on ease of access, delivery, security, and other factors dependent on the organization's needs.
4. *Workflow:* Rules are designed to keep content moving through various roles while maintaining consistency with the organization's policies.
5. *Editing:* This step involves managing multiple content versions and presentation changes.
6. *Publishing:* The stage where content is delivered to users, which can be defined as website visitors or internal publishing via the intranet for employees.
7. *Removal/Archives:* The final stage is where content is deleted or moved to an archive when it is infrequently accessed or obsolete (Rouse, 2017).

6.2.3 Content Management System

A computer application that allows publishing, editing, and modifying content, as well as organizing, deleting, and maintenance, from a central interface. Such systems provide procedures to manage workflow in a collaborative environment. Content management systems are often used to run websites containing blogs and news. Many corporate and marketing websites use content management systems, which typically avoid the need for hand coding. The platforms, tools, and repositories (including Intranet, Work Tile, and WeChat) can be further leveraged for organization-wide knowledge sharing and serve as internal content management and information-sharing spaces. The main internal knowledge platform function is to share information within the organization and facilitate knowledge sharing among staff (Janus, 2016).

 Most simply, a content management system is software that supports users to create, manage, and modify the content of a system without the need for specialized technical knowledge. A website, Wikipedia, blog, etc., are examples of the content management system. Such systems are made up of two core parts:
1. A content management application - this is the part that allows you to add and manage content on your system.
2. A content delivery application - this is the backend, behind-the-scenes process that takes the content you input in the content management application, stores it properly, and makes it visible to your visitors (Newcomer, 2020).

6.3 TYPES OF CONTENT MANAGEMENT SYSTEMS

Based on functionality, content management system is mainly categorized into five types. The content management system:
1. Nominal Web content management system
2. Dynamic websites

3.   Full Web content management system
4.   Enterprise content management system.
5.   Global content management (Boiko, 2001; Wallace, 2007)

6.3.1 Nominal Web Content Management System
The first-generation content management systems were based on hypertext markup language and are known as nominal Web content management systems, static. The systems paved the way to create new and vibrant systems.

6.3.2 Dynamic Websites
A dynamic website is a system for producing Web pages on the fly as users request them. The system is comprised of data sources, template pages, a Web server, and the user's browser (website interface).

6.3.3 Full Web Content Management System
Such systems do have to be 100% static or 100% dynamic. A vast majority of the large website are examples of full Web content management systems.

6.3.4 Enterprise content management system
Such systems encompass content creation and organization of the entire organization. The systems can provide a content repository where information can be reviewed and worked on independently. More specifically, it can produce websites and any other required publications from the stored content.

6.3.5 Global content management
In addition to Boiko's (2001) categorization of the content management system, Wallace (2007) also reported global content management. It is a system that could manage the world's recorded knowledge, a dream since ancient times. The advancements in information and communication technologies paved the way to convert the dream into reality. The digital and virtual libraries, and the World Wide Web as a universal knowledge repository are the key initiatives of global content management systems.

6.4   CONTENT MANAGEMENT TOOLS

Different content management systems are being adopted in different enterprises. Some common examples of the systems are WordPress, Joomla, Drupal, Magento, Squarespace, Wix, and Ghost (Newcomer, 2020).

6.5 SELF-ASSESSMENT QUESTIONS

1. Is knowledge representation an interdisciplinary concept, if yes why?

2. Do you think library professionals are aware of the role of knowledge representation while developing knowledge management systems?

3. What are the pros and cons of open-source and commercial content management tools?

4. Do you think Web 2.0 technologies can be used as content management tools? If yes, how?

6.6 ACTIVITIES

1. Browse the AIOU website and enlist the main functions, services and issues while searching for relevant information. Visit the AIOU webmaster and discuss the pros and cons of the content management tool being used. How the website's contents can be optimized in terms of usefulness and ease of use.

2. Find and watch videos on how to edit entries in Wikis.

3. Watch YouTube videos of content management tools. Which tool do you think is the best for developing AIOU knowledge repository?

4. Doing critical literature, and comparing open source and commercial content management tools.

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TAXONOMIES AND ONTOLOGIES

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CONTENTS

INTRODUCTION

Although the terms taxonomy and ontology are sometimes used interchangeably. However, still, there is a critical difference between the two terms. A taxonomy indicates only a class/subclass relationship whereas an ontology describes a domain completely. The essential mechanisms that ontology languages provide include their formal specification and their ability to define properties of classes. Through properties, very accurate descriptions of services can be defined and services can be related to other services or resources (Sugumaran, 2016). Ontologies are content theories about the sorts of objects, properties of objects, and relations between objects that are possible in a specified domain of knowledge. They provide potential terms for describing our knowledge about a domain (Gilchrist, 2003). An ontology identifies and distinguishes concepts and their relationships; it describes content and relationships. A taxonomy formalizes the hierarchical relationships among concepts and specifies the term to be used to refer to each; it prescribes structure and terminology (Beter, 2004).

OBJECTIVES

After reading this unit, you would be able to:

1. Explain taxonomy and ontology and how the knowledge organization tools are different from the traditional knowledge classification schemes.

2. Explain the benefits of taxonomies and ontologies in libraries.

3. Explain knowledge management ontology.

7.1 TAXONOMY

A taxonomy plays a significant role in the development of knowledge management strategy and subsequent implementations and operations. Primarily, taxonomy provides a starting point for communication about the knowledge asset about which a clear understanding is often limited. Organizations mainly consider taxonomy as a key component of knowledge management strategy. This indicates that there is a recognition of the need to understand the nature and structure of the organizational knowledge assets that need to be managed. In organizations, volumes of information are stored in unstructured ways in multiple repositories, databases and libraries, often with vague naming conventions that give little insight into the content and its relevance to the user. The development of enterprise taxonomy is an attempt to bring structure to this amorphous mass and deliver productivity through more effective and expeditious retrieval and use (Dilnutt et al., 2003).

Organizations have explored knowledge management approaches in the ongoing attempt to improve business performance. Those organizations that have taken a holistic approach to create a knowledge management programme have recognized the importance of taxonomy as the basis for understanding their knowledge and information assets. For these organizations, taxonomy provides:
- Structure for Organization to understand and communicate its knowledge and understanding;
- The common context for submitting, storing and retrieving knowledge (content) from the global repository such as the intranet;
- Fundamental aid in identifying the stages of development of each area of knowledge;
- Governance model for terminology and relationships between various people, knowledge objects and information management systems; and
- Most importantly the taxonomy reflects organization culture (Dilnutt et al., 2003).

Several scholars and practitioners have developed taxonomies in different domains. The concept of taxonomy is difficult to define and is defined broadly by classifiers in most cases (Oyelude, 2020). Oxford Advance Learner's Dictionary (1995) defines taxonomy in two ways. Firstly, it is a scientific process of classifying living things. Secondly, it is a system of classifying things. According to Metaxiotis (2011), taxonomy is a hierarchical structure for organizing a body of knowledge that gives a framework for understanding and classifying knowledge. According to Dalkir (2011), knowledge taxonomy is a scheme that partitions a body of knowledge and defines the relationships among the pieces; used for classifying and better understanding the body of knowledge.

Taxonomy is a basic classification system that enables the conceptual identification of concept hierarchies and dependencies. A hierarchical structure is used for categorizing a body of information or knowledge, allowing an understanding of how that body of knowledge can be broken down into parts, and how its various parts relate to each other. Taxonomies, mainly defined as classification systems that are used to organize information, help users to find relevant information (Dalkir, 2017). Taxonomies, based on established classification systems like Dewy Decimal Classification, are helpful for inexperienced users who are not familiar with the structure and terminology of a domain (Saeed & Chaudhry, 2002).

7.1.1 Knowledge Taxonomy

Knowledge taxonomy is a scheme that describes a body of knowledge and defines the relationships among the pieces; used for classifying and better understanding the body of knowledge (Dalkir, 2017). Taxonomies are basic classification systems that enable us to describe concepts and their dependencies in a hierarchical fashion. The higher up the concept is placed, the more general or generic the concept is. The lower the concept is placed, the more specific an instance it is of higher-level categories. Knowledge taxonomy, sometimes known as a knowledge map, allows knowledge to be graphically represented in such a way that it reflects the organization of concepts within a field of expertise or for the organization at large. Figure 7.1 explains knowledge taxonomy (Dalkir, 2017).
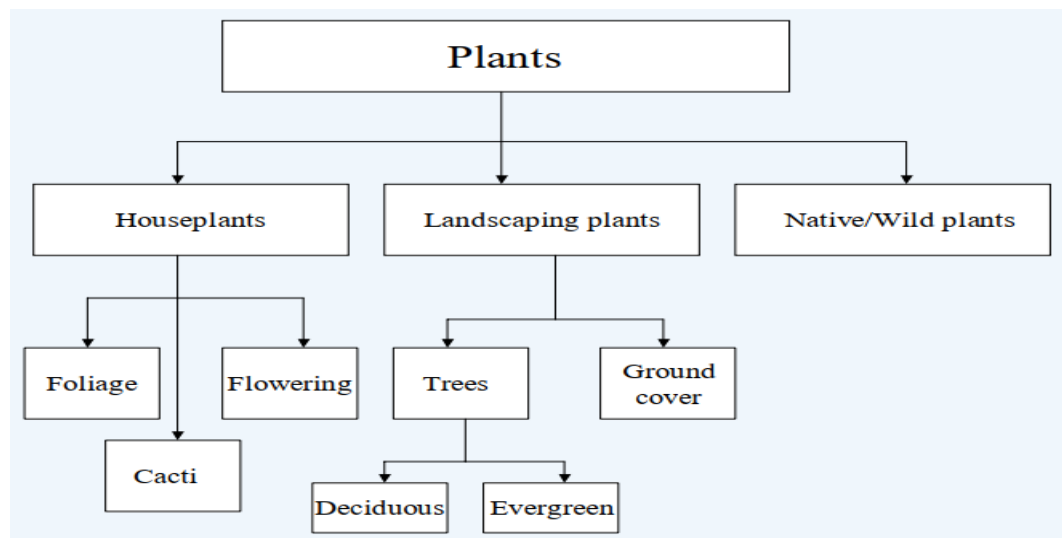

Figure 7.1: Example of knowledge taxonomy (Dalkir, 2017)

Library professionals developed classification schemes, e.g., Dewy Decimal classification, Library of Congress classification scheme, Colon classification, and so on, to organize knowledge. Such intellectual tools provide a generic representation

of knowledge of all domains. The advances in information and communication technologies and especially the introduction of the World Wide Web have created a very conduce environment to develop, share and use/re-use information resources in entire enterprise. The generic knowledge classification schemes are found difficulties to organize digital resources. The technological developments in the information field led professionals to devise customized knowledge classification to address the issues of information organization and efficient retrieval in a knowledge domain, e.g., computer science, knowledge management, etc., at the micro and macro level (Qin & Stephen, 2001). Like in business organizations, library professionals developed taxonomies to provide the right information in the right format. Based on the Dewy Decimal classification scheme and IEE indexes, Saeed and Chaudhry (2002) developed a taxonomy, using the shareware tool My Info, to facilitate browsing information resources in an electronic environment (Figure 7.2). It also combines the capabilities of hierarchies of knowledge with the terms of narrower, broader, and relative terms into categories.
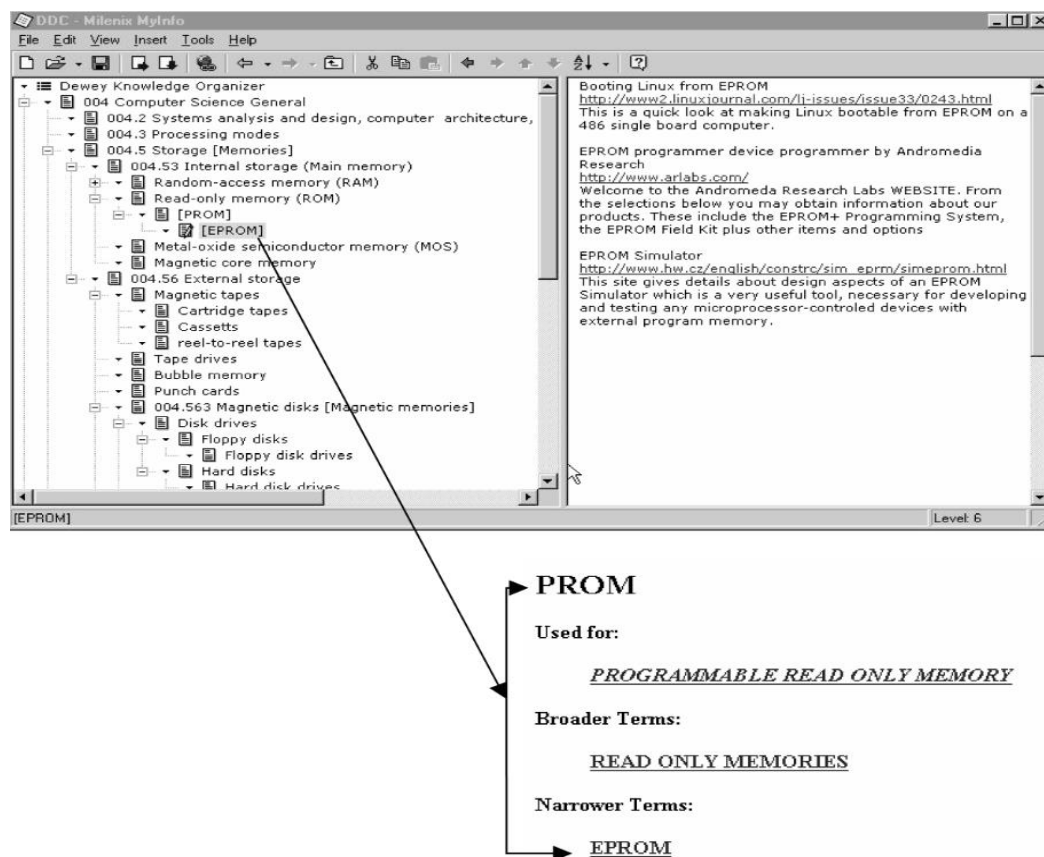

Figure 7.2: DDC's taxonomy structure with terms from IEEE Web Thesaurus
(Saeed & Chaudhry, 2002)

74

7.2 ONTOLOGY

Conventional knowledge organization tools such as classifications and thesauri resemble ontologies in a way that they define concepts and relationships sy stematically, but they are less expressive than ontologies when it comes to machine language (Qin & Stephen, 2001). The ontological analysis clarifies the structure of knowledge that enables knowledge sharing. Without ontologies or the conceptualizations that underlie knowledge, there cannot be a vocabulary for representing knowledge. Thus, the first step in devising an effective knowledge representation system, and vocabulary, is to perform effective ontological analysis of the field, or domain (Chandrasekaran, Josephson, & Benjamins,1999).

The concept of ontology can be defined and explained in two ways. Firstly, from the philosophical perspective ontology is the branch of metaphysics that deals with the nature of being. It is a complex discipline that explores the nature of what is, how existence can be determined and understood, the general nature of existence, and the characteristics of things that are (Wallace, 2007). Secondly, researchers discuss the development of ontologies and their application in different domains including knowledge management.

Since the early 1990s, ontologies have been studied by several artificial intelligence research communities, including knowledge engineering, natural-language processing, and knowledge representation. More recently, the use of ontologies has also become widespread in different fields such as intelligent information integration, cooperative information systems, information retrieval, electronic commerce, and knowledge management. The ontologies are becoming popular due to a shared and common understanding of a domain that can be communicated between people and application systems. From the knowledge management systems perspective, ontologies help to minimise the issues associated with efficient searching information, extracting information, maintaining weakly structured text sources, and automatic document generation. The tools create a dynamic link between users and the knowledge repository so that users can find, share, summarize, visualize, browse, and organize knowledge (Davies, Fensel, & Van Harmelen, 2003).

Theories in artificial intelligence can be classified into two broad categories: namely, mechanism theories and content theories. Ontologies are content theories about the sorts of objects, properties of objects, and relations between objects that are possible in a specified domain of knowledge. They provide potential terms for describing our knowledge about the domain. In practice, information-retrieval systems, digital libraries, integration of heterogeneous information sources, and

Internet search engines need domain ontologies to organize information and direct the search processes (Chandrasekaran, Josephson, & Benjamins, 1999).

An ontology explains common vocabulary for researchers who need to share information in a domain. It includes machine-interpretable definitions of basic concepts in the domain and relations among them. Ontologies support:
- To share a common understanding of the structure of information among people or software agents.
- To enable the reuse of domain knowledge.
- To make domain assumptions explicit.
- To separate domain knowledge from operational knowledge.
- To analyze domain knowledge (Noy & McGuinness, 2000).

Scholars and practitioners have developed ontologies in entire enterprise. Petrides and Ngyuen (2006) also indicated ontologies being practised in the areas of higher education:
- Academic disciplines
- The marketplace of institutions
- The documentation of data
- Metadata about learning management systems
- The nature of the higher education enterprise
- Online resources, such as links and training materials

Several definitions of ontology are postulated in the of extant literature. Most simply, ontology is an explicit specification of the concepts that characterize a domain, and of their interrelation (Buchholz, 2011). It is important to note that concepts are the basis for the interpretation of data. An ontology makes explicit the set of concepts that characterize a domain. It also indicates how the concepts are related. For example, an ontology for banking would include the concepts of account, account owner, and balance, and would tell that an account has an account owner, and that balance is an attribute of an account (Berztiss, 2011). Overall, domain ontology enables knowledge reusability suitable both for human beings and program modules and thus is suitable for recommender systems that recommend items to users according to their preferences and characteristics of the required item (Kurilovas & Juskeviciene, 2015).

7.2.1 Types of Ontologies
There are two types of ontologies, namely, (1) formal ontology and (2) informal ontology (Buchholz, 2011).

1.   Formal ontology

A formal ontology seeks to capture the essence of selected aspects of existence by stating explicitly and formulaically the concepts of the various constituents of the domain being modelled and the relationships that pertain among them. Ontologies are said to be formal or formalized when they are capable of being rendered into a computer programming language. Moreover, formal ontologies are characterized by their rigorous use of explicit definitions and logical structure, which makes it possible for them to be shared and reused in various computer applications that need accurate and succinct information models for processing.

2.   Informal ontology

Informal ontologies, to a greater or lesser degree, have some of the characteristics of formal ontologies, particularly selected groups of terms or labels relevant to some topic or area of interest (a document collection, Website, product catalogue, or business area) (Sowa, 2000). An informal ontology may be stated in a natural language. When the components of the informal ontology are arranged hierarchically, they are often termed classifications or taxonomies. The informal ontologies do not have the expressive power that may need to be harnessed for sophisticated purposes in academia, business, medicine, law, or government (Sowa, 2015).

Overall, domain ontology enables knowledge reusability suitable both for human beings and program modules and thus is suitable for recommender systems that recommend items to users according to their preferences and characteristics of the required item (Kurilovas & Juskeviciene, 2015).

7.3   KNOWLEDGE MANAGEMENT ONTOLOGY

An ontology that explicates the components of knowledge management phenomena. Knowledge management ontology defines knowledge management as an entity's (such as an individual, group, organization, community, or nation) deliberate and organized efforts to expand, cultivate, and apply available knowledge in ways that add value to the entity, in the sense of positive results in accomplishing its objectives or fulfilling its purpose. As shown in Figure 7.3, there are the three primary components that drive the execution of a knowledge management ontology are knowledge manipulation activities, knowledge resources, and knowledge management influences (Holsapple & Joshi, 2004; Holsapple & Joshi, 2011).
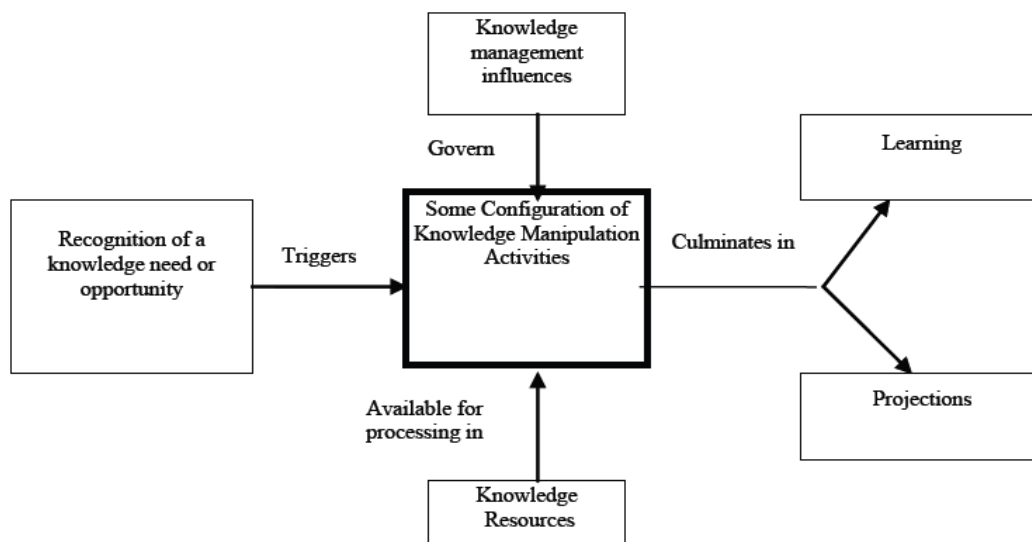
Figure 7.3: Architecture of a KM episode, Source (Holsapple & Joshi, 2004; Holsapple & Joshi, 2011)

7.4 SELF-ASSESSMENT QUESTIONS

1. To what extent library professionals are successful to address the issues associated with the organization, accessing, and retrieving digital information resources?

2. Do you think that taxonomies and ontologies are efficient tools to accommodate the multi-dimensionality of digital resources?

3. What are the benefits of using taxonomies and ontologies to organize digital resources in libraries?

4. Why should knowledge management experts develop knowledge management ontology?

5. To what extent Pakistani library professionals are successful to develop taxonomies and ontologies for digital resources?

6. What are the key characteristics of the taxonomy and ontology of digital resources?

7. What standard procedures are adopted to develop knowledge management ontologies?

7.5 ACTIVITIES

1. Review the extent of literature and enlist challenges confronting the traditional knowledge classification schemes for representing, searching, and retrieving information resources in an electronic environment.
2. With the help of your tutor, develop an ontology of Web 2.0 tools from the librarianship perspective.
3. Use concept analysis to clarify taxonomies versus ontologies.
4. Identify key authors in developing knowledge management ontologies. What are their contributions to the development of the knowledge management domain?
5. With the help of your course develop a context-specific knowledge management ontology.

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Unit–8

INFORMATICS AND INFORMATION TECHNOLOGY

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CONTENTS

INTRODUCTION

Since the 1970s, informatics has increasingly been adopted to explain the application of information technology to different fields, for example, medical informatics, legal informatics, organizational informatics, and social informatics. Informatics as a young academic discipline overlaps with many existing academic disciplines, such as computer technology, information science, information systems, and information communication (He, 2003).

With the rapid development of information technology, informatics as a discipline has attracted the attention of information professionals and researchers worldwide. Therefore, the discipline encompasses the structure and the qualities of professional applications involving various academic disciplines such as computer science, information studies, information management, systems engineering, mathematics, statistics, human-computer interaction, medicine, linguistics, psychology, and cognitive science. Informatics address two key goals; firstly, the study of the nature of information in all its forms that leads to the classification, organization, representation, storage, retrieval, understanding and use of information, and secondly, to define, acquire, share, and utilize knowledge within various organizations in the real-world situation (He, 2003).

Informatics deals mainly with three entities, namely, domain-specific information, people, and technology as well as their interaction to manage and use information and knowledge. Since this course covers the cores of the knowledge management domain, therefore, in this unit the following topics are discussed:
- Knowledge management and technology
- Technology and people
- Challenges to the role of information technology in knowledge management
- Social informatics
- Applications of social informatics

OBJECTIVES

After reading this unit, you should be able to:

- Define and explain informatics and its application in knowledge management.

- Explain the role of different technologies in identifying capturing, organizing, storing, and sharing new knowledge.

- Explain social informatics.

8.1 INFORMATICS

The term informatics was first coined by a German computer scientist by the name of Karl Steinbuch in 1957 through his published paper titled "Informatics: Automatic Information Processing." Informatics was then used interchangeably with computer science as its German word "Informatik" is usually translated to English as computer or computing science. In 1994, the University of Edinburgh in Scotland formed a grouping that is now its School of Informatics and gave the general meaning of informatics as "the study of the structure, algorithms, behaviour, and interactions of natural and artificial computational systems." The meaning gained widespread use in the UK (Techopedia, 2022).

There is still no universal meaning for informatics as different organizations, educational or otherwise, have their meaning for it. But all of these different ways of defining informatics still adhere to the same core that it is about the study and application of information and information technology in everyday processes (Techopedia, 2022).

The term informatics is currently enveloped in chaos. One way to clarify the meaning of informatics is to identify the competencies associated with training in the field, but this approach can conceal the whole that the competencies automatically describe (Friedman, 2013). Informatics is a discipline tracking (leading) the development of information technology, with the ambition to put that technology to good use, acting both on the technology and on the organization of its use (Dahlbom, 996). The Oxford English Dictionary (2000) defines informatics as the discipline of science which investigates the structure and properties (not specific content) of scientific information, as well as the regularities of scientific information activity, its theory, history, methodology and organization.

Informatics as an interdisciplinary field is concerned with the study of the nature of information and technology focusing on how people bring them together to produce and manage information and knowledge. The interdisciplinary characteristic of informatics supports to integration of domain-specific theories and methods for organizing, retrieving, and distributing information with new information technologies (He, 2003).

8.1.1 Applications of Informatics
Informatics has found applications in several academic and professional areas. Following are examples of the applications of informatics:
* Biological informatics
* Clinical informatics
* Dental informatics
* Environmental informatics

- Geomatics
- Legal informatics
- Management informatics
- Medical informatics
- Museum informatics
- Neuro informatics
- Nursing informatics
- Organizational informatics
- Social informatics (He, 2003).

8.2 KNOWLEDGE MANAGEMENT AND TECHNOLOGY

Technology plays a key role to manage all types of knowledge assets. The effective management of strategic assets is required to solve knowledge and information problems in organizations (Wallace, 2007). Technology is a key enabler for knowledge management activities, especially knowledge sharing (Nonaka & Takeuchi, 1995; Moffett, McAdam, & Parkinson, 2003). Information technology can accelerate knowledge-sharing capabilities in both time and space dimensions if it is properly used (Mohamed, Stankosky, & Murray, 2006). So, technology is equally important as any of the other three pillars of knowledge management that is organization, learning and leadership (Stankosky & Baldanza, 2000). Several technologies such as intranets, document management systems, information retrieval engines, information retrieval engines, brainstorming applications, data warehousing and mining tools, contribute to an organization's knowledge management (Chugh, Chugh, Punia, & Agarwal, 2013).

In the contemporary competitive world, knowledge is a key strategic asset to compete and sustain organizational performance. Hislop (2005) highlights the importance of knowledge in three ways: (1) knowledge is of central importance to advanced economies, (2) knowledge is key to organizational performance, and (3) organizations and work have become more knowledge-intensive. Knowledge management is referred to the effective learning processes associated with the exploration, exploitation and sharing of human knowledge (tacit and explicit) that use appropriate technology and cultural environments to enhance an organization's intellectual capital and performance (Jashapara, 2004). Information technology is one of the core enabling factors for identifying and capturing organizational knowledge. Such technologies support both internal and external knowledge-sharing activities (Chou &Lin, 2002). Hislop (2005) indicated that information and communication technologies, for example, computers, telephones, e-mail, databases, data-mining systems, search engines, internet, and video-conferencing equipment, mediate and facilitate the management and/or sharing of knowledge and information. tate-of-the-

art computer storage and retrieval techniques improve organizational memory (Alavi & Leidner, 2001). The advancement in technologies such as Web 2.0 tools has created a dynamic environment for sharing information and knowledge at individual and organisational levels (Jashapara, 2004; Arif & Kanwal, 2016).

Discussing the role of technology in the knowledge management domain, Gallupe (2001) describes the following four key purposes for knowledge management technologies/tools:

- *Encouraging serendipity*: knowledge-management practices support for problem identification. The technologies that contribute include chat rooms, environmental scanning, and search functions.
- *Knowledge creation:* knowledge management practices focus on knowledge creation to solve problems through knowledge forums, communities of practice, and structured brainstorming. The examples of tools for this purpose include electronic brainstorming tools and electronic discussion boards.
- *Knowledge acquisition*: the technologies focus on organizing knowledge, extracting tacit knowledge to make it explicit, and designing schemes to store knowledge so that it can be easily retrieved. For example, knowledge repositories and knowledge map support knowledge codification and storage.
- *Mentoring and training:* knowledge management systems support knowledge dissemination and sharing focusing on problem recognition of previously solved problems. Such tools include activities that support formal online learning and informal interpersonal communication.

From the objective perspective of knowledge, information and communication technologies perform two keys in the management of knowledge: firstly, the codification of knowledge, and secondly the storage of knowledge in some repository. In addition to the two roles, there are five further ways in which information and communication technologies can be used to manage an organization's knowledge. Table 8.1 describe the specific roles of information and communication technologies (ICT) in knowledge management (Hislop, 2005).

Table 8.1: Knowledge management and technology

Knowledge management role	ICT application
Searching for/Finding Knowledge	Search engines, Web Porta
Creating knowledge	CAD (computer-aided design) system
Utilizing knowledge	Decision support systems
Sharing knowledge	Intranets and e-mail
Integrating knowledge	Groupware

8.2.1 Technology and People

Knowledge management is not a technology-based concept. Technology can support knowledge management, but it is not the starting point of a knowledge management program. People, key actors, initiate knowledge management programs with the support of technology. Like other important entities, for example, business objectives, knowledge and its different types, technology is an enabling factor to manage knowledge resources (Dalkir, 2017). In an organization, several other factors impact knowledge management activities. For example, five key factors such as macro-environment, organizational culture, people aspects, information processes, and technological application are the core components of knowledge management activities. The factors not only describe the current organization's standing but also predicts how organizations can optimize business performance through knowledge management implementation. Among the five factors, people and technology are the two fundamental enablers that support knowledge-based activities in an organization (Moffett, McAdam, & Parkinson, 2003).

During organizational knowledge-based practices, people are considered the core actors that create knowledge at individual, team, and organisational levels (Nonaka & Takeuchi, 1995). Thus, organizations should consider employees as the most important knowledge resource, therefore, an employee must participate and engage in knowledge-sharing activities (Szulanski, 1996). In addition to people, technology is a key enabler that creates a conducive environment to boost knowledge sharing and transfer as meditation. And sometimes technology act as mediating factor in knowledge management and innovation. It means knowledge-related activities and technology are considered part and parcel (Nunes, Kanwal, & Arif, 2018). By summing, people and technology are inevitable for knowledge management implementation, development, and maintenance (Moffett, McAdam, & Parkinson, 2003).

8.3 CHALLENGES TO THE ROLE OF INFORMATION TECHNOLOGY IN KNOWLEDGE MANAGEMENT

Identifying and define the technologies essential for knowledge management is a major challenge to comprehending and communicating the role of technology in knowledge management (Wallace, 2005). The success of knowledge management implementation in organizations mainly depends upon several internal and external organizational factors. However, the technology factors, for example, information technology/communication system, connectivity, usability, repository/access, security of information technology, searching information technology, and intellectual property, are critically important for the success of knowledge management implementation at an organization level (Sedighi & Zand, 2012). From the higher education perspective, resistance to change, lack of commitment and lack of cooperation from faculty members are big challenges to implementing knowledge

management systems. Using information technologies allows access to knowledge anywhere, anytime requires changes in security policies to avoid misuse of knowledge. So, devising a security policy is another challenge to implementing a knowledge management system. Moreover, knowledge management includes different processes and people that create certain pressure on staff that may lead to a commitment to use a knowledge management system (Ali, Sulaiman, & Cob 2015).

8.4 SOCIAL INFORMATICS

Social informatics is an emerging discipline that draws researchers who focus on the inter-relationships among people, their institutional and cultural contexts, and their uses of information and communication technologies. It focuses on the relationships among people, information and communication technologies, and the social structures of their development and use (Lamb & Sawyer, 2005). Generally, social informatics is referred to the body of systematic research about the social aspects of information and communication technology. The information and communication technology means eartefacts and practices for recording, organizing, storing, manipulating, and communicating information. Specifically, social informatics is meant for the interdisciplinary study of the design, uses and consequences of information and communication technologies that consider their interaction with institutional and cultural contexts (Kling et al., 2000). According to He (2003), social informatics identifies a body of research that examines the social aspects of computerization in institutional and cultural contexts, and studies the design, uses and consequences of information and communication technologies.

8.5 SELF-ASSESSMENT QUESTIONS

1. What advantages and disadvantages have you personally found in internet search engines for information and knowledge searching?

2. What technical and management issues need to be addressed to effectively deploy information technologies in organizational knowledge management?

3. To what extent Pakistani higher education institutes are leveraging information technologies technology to manage knowledge?

4. What are the applications of social informatics?

8.6 ACTIVITIES

1. Review knowledge management literature and enlist the technologies along with a brief description that contributes to knowledge management activities from the higher education perspective.

2. Conduct a systemic literature review on the role of information technology in managing knowledge assets of Pakistani universities and share your findings with your tutor.

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FUTURE OF KNOWLEDGE MANAGEMENT

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CONTENTS

INTRODUCTION

In the recent past, the rapid development of information and communication technologies, especially the Internet and the World Wide Web applications, has influenced various aspects of work and everyday life. Resultantly new tools and techniques were developed and used for collecting, organizing, and analyzing data. Moreover, the socio-technological developments paved the way for the quick sharing of information and knowledge among individuals and groups (Dalkir, 2017; Masic, Nesic, Nikolic, & Dzeletovic, 2017; Wiig, 1997). In a knowledge-based economy, effective knowledge management (KM) is important for organizations to remain competitive, innovative and perform well (Yeh et al., 2012). To make progress in the competitive business environment, the importance of knowledge and its management has been increased. Dumitriu (2016) defines knowledge management as the systematic processes, or range of practices, used by organizations to identify, capture, store, create, update, represent and distribute knowledge for use, awareness and learning across an organization. There are a variety of definitions of knowledge management that reflect the specific interests of individual organizations according to their particular priorities. For example, emphasis may be placed on the process and its systematic nature as follows: knowledge management is the process of applying a systematic approach to capture, structuring, manage and dissemination knowledge throughout the organization to work faster, reuse best practices and reduce costly rework from project to project (Dumitriu, 2016; Dalkir, 2005). Several knowledge management benefits were acknowledged in the knowledge management literature:

(a) Improved organizational effectiveness by ensuring that programmes are designed based on the latest knowledge, capitalizing on experience and expertise acquired by the staff;

(b) Improved organizational efficiency and reduced costs through strengthening the ability to respond quickly to emerging issues on the ground, rapid mobilization of organizational expertise and experience, avoidance of previous mistakes and duplication of efforts;

(c) Facilitation of the adoption of an integrated programming approach, by establishing and empowering communities of practice and networks that cut across sectors and geographic locations (Dumitriu, 2016).

Keeping in view the significance of the knowledge management domain, this unit discusses briefly explains the evolution of knowledge management, the challenges to managing knowledge resources, and the future of the knowledge management field, especially from the Pakistani perspective.

OBJECTIVES

After reading this unit, you should be able to:

1. Explain the evolution of the knowledge management field.

2. Understand what challenges are being hindered in terms of theory and practice in the knowledge management field.

3. Predict growth in theory and practice of knowledge management domain.

9.1 EVOLUTION OF KNOWLEDGE MANAGEMENT

The notion of knowledge management became popular during the late 1980s. Knowledge management conferences began appearing and knowledge management books were published. The notion of knowledge management was also reflected in business-related journals. In fact, knowledge management has been practised for ages. Historically, knowledge has always been recognized and managed at least implicitly. However, the importance of intangible assets has been recognized during the second half of the 20th century. The core actors such as librarians, philosophers, teachers, and writers have been employing the same techniques for centuries (Dalkir, 2017). Figure 9.1 illustrate the timeline of the knowledge management domain.
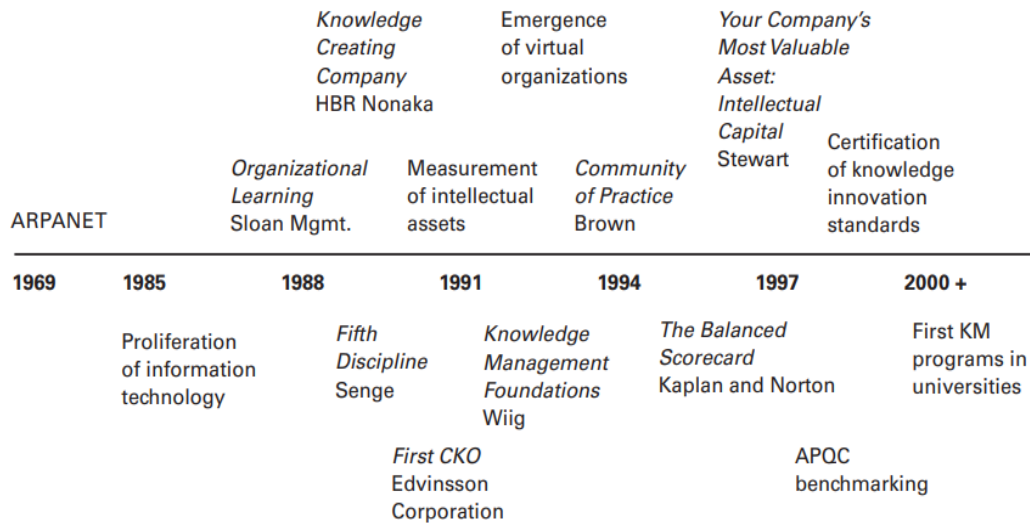
Figure 9.1: A summary timeline of knowledge management (Dalkir, 2017)

During the last three decades, significant growth in the knowledge management domain is quite visible in terms of conferences, books, standardization in knowledge management practices, establishments of consulting firms and visibility of knowledge management as an academic discipline. Dalkir (2017) summarizes the knowledge management milestones as explained in Table 9.1.

Table 9.1: Knowledge management milestones

Year	Entity	Event
1980	DEC, CMU XCON Expert System	EXCON Expert System
1986	Dr Karl Wiig	Coined knowledge management concept at the UN
1989	Consulting firms	Started internal knowledge management projects
1991	Nonaka and Takeuchi	HBR article
1993	Dr Karl Wiig	The first knowledge management book published
1994	Knowledge management Network	First knowledge management Conference
1998	Davenport and Prusak	Publish working knowledge
The mid-1990s	Consulting firms	Start offering knowledge management services
Late1990s	Key vertical industries	Implement knowledge management and start seeing benefits
2000–2003	Academia	KM courses/programs in universities with knowledge management texts
2003 to present	Professional and academic certification	Knowledge management degrees offered by universities, by professional institutions such as Knowledge Management Consortium International and PhD students completed knowledge management dissertations
2015	KM added to ISO Standard 9001:2015	While not a KM standard per se, knowledge is recognized as an organizational resource to be managed in a new clause
2013 to present	AIIM Standards Board Committee on knowledge management education standards	The Association for Information and Image Management Standards Board established a committee for knowledge management education and training standards.

Source: (Dalkir, 2017)

The contemporary emphasis on knowledge management has resulted from the economic, industrial, and cultural developments, that took place during the 20th century. The historical developments may be aligned with the following descriptive stages of dominant economic activities and focus (Wiig, 1997):

9.1.1 Agrarian Economies
The agrarian economy mainly focuses on raising crops and domesticating animals. Knowledge is not generally recognized in such economies (Wiig, 1997).

9.1.2 Natural Resource Economies

In a natural resource economy, people facilitate the conversion of resources to marketable goods and then bring them to markets, mostly by performing the physical work required. Knowledge started to recognize in the economies (Wiig, 1997).

9.1.3 Industrial Revolution

During the 18th and 19th centuries conversion of natural resources and manufacturing of products were increasingly better organized and mechanized to improve the efficiency of the processes. For the economies, knowledge was recognized but only among the business-associated persons (Wiig, 1997).

9.1.4 Product Revolution

Market advantages were based on having improved products that would fit a market in terms of functionally and economically. The roles of professionals and craftspeople were changing to where expertise, particularly in the form of skills, was becoming important. Recognition of the value of broad individual knowledge had not changed from the industrial era and was still not explicit (Wiig, 1997).

9.1.5 Information Revolution

During the second half of the 20thcentury, tremendous progress has been witnessed in every aspect of life. The changes were caused due to technological revolution. Information technology became available and resulted in closer control of manufacturing, logistics, and marketing. The roles of people were gradually changed from physical work in production (manufacturing) to desk work in service (often clerical). The real nature of mental work performed in this new environment was still not well understood or appreciated (Wiig, 1997).

9.1.6 Knowledge Revolution

During the last decade, knowledge has been recognized as a strategic resource to maintain a competitive advantage in the competitive market. This realization led organizations to pursue strategies to manage knowledge explicitly (Wiig, 1997).

9.2 CHALLENGES TO KNOWLEDGE MANAGEMENT

Knowledge management is about what knowledge is and how to manage it. Also, it focuses on how to develop knowledge management strategies that could successfully leverage individual and organizational knowledge. Knowledge itself is a multidimensional concept. At the same time, it can be personal, situated, and socially constructed. The domain of knowledge management finds its origins in many different disciplines, for example, anthropology and sociology, computer science,

organizational science, cognitive science, information technologies, information and library science, linguistics and computational linguistics, education and training, technical writing and journalism, storytelling, communication studies, and so on. Due to the interdisciplinary nature of the field and the complexity of knowledge (multifaceted and multilayered), its management is very difficult. To manage knowledge resources, organizations face different kinds of challenges. For example, firstly, they need to adapt to an increasing pace of change and technological development. Secondly, there are growing concerns over the now ongoing retirement of the baby boomer generation. Thirdly, there is an explosion in information. Additionally, several challenges confront to manage knowledge assets, such as a lack of a universal definition of knowledge and knowledge management, cultural differences, ethical issues associated with the management of knowledge, a measure of knowledge outcomes, a lack of unifying theories, and a highly complex landscape. The challenges are just the tip of the iceberg (Crane, 2016).

The above discussion reveals that the domain of knowledge management has been evolving since the 1980s. During the last two decades, tremendous developments in the business industry caused shifting from an industrial society to a knowledge-based society (Fernanda, & Salwa, 2018). Importantly, rather than focusing on organizing, documenting, and capturing information and knowledge, a new way of knowledge has been conceptualized, including the importance of context, culture, people, the social nature of knowledge management, collective knowledge, and innovation. The technologies such as social media, big data, analytics, etc. have added a new dimension of knowledge (Masic, Nesic, Nikolic, & Dzeletovic, 2017). Several fields such as architecture, business administration, education, engineering, and library and information science, have experienced a long time to seek professional identities. The same has been occurring in the knowledge management domain. However, in terms of theoretical and practical aspects, numerous frameworks and models have been developed and implemented in entire enterprise. In contrast to the progress, still the domain lacks uniform theoretical frameworks, models, and theories (Wallace, 2007).

Several researchers identified challenges to knowledge management practices in different settings. Holsapple (2013) identified a large array of challenges in knowledge management design and implementation from the United Nations perspective. They can be grouped as follows:
1. Lack of common terminology, strategic vision and guidance within the United Nations Secretariat and system-wide;
2. Lack of support and sponsorship at the senior management level;

3. Insufficient staff awareness and organizational culture, including the absence of recognition, incentives and sanctions concerning knowledge-sharing attitudes;
4. Difficulties in measuring knowledge management impact and in adopting indicators;
5. Loss of tacit knowledge owing to lack of continuity and adequate knowledge-retention policies;
6. Persistence of the bad practice of working in silos;
7. Incompatibilities artificially created by the technological infrastructure;
8. Lack of financial resources.

In the knowledge management domain, scholars and practitioners classified generic knowledge management processes somewhat differently both in number and content which leads to diverse classifications. However, knowledge sharing is a key process without which knowledge management has no value. So, it is important to know what challenges to organizational knowledge sharing are. Holsapple (2013) highlighted some key challenges to knowledge sharing from the international organization perspective. These challenges are:
1. Knowledge-sharing expectations and processes are not systematically embedded in the programme and project cycle to capture lessons with an aim of reuse;
2. Knowledge sharing is not yet fully institutionalized as a natural cross-functional and cross-practice exercise;
3. Even though communities of practices significantly contributed to open sharing across regional silos, flattening hierarchies and increasing knowledge flows among professional peers, the fact that they were directly aligned with thematic business units also nurtured the emergence of new thematic silos;
4. Staff lack incentives and time to engage in knowledge sharing and learning beyond the bounds of their immediate deliverables;
5. Metrics and indicators for successful knowledge management are underdeveloped, and the potential of evidence-based statistics, including social network analysis, for incentives, business intelligence and data-driven decision making are underutilized;
6. Internal hierarchies and political sensitivities favour private knowledge sharing, with public sharing limited to highly processed knowledge products;
7. The traditional corporate focus of knowledge sharing tends to be on ensuring that traditional donors and direct project clients are included in knowledge exchanges, while engagement with the wider academic and policy communities, emerging and non-traditional donors, civil society and the general public have not been systematized.

The above-mentioned challenges to knowledge management can be addressed to get the maximum benefits of knowledge resources. To manage the challenges, the following are some key suggestions:

1. The existence of a strategy and/or policy documents and/or guidelines aimed at defining, institutionalizing and operationalizing knowledge management processes and tools;
2. The integration, alignment or programmatic connection of such documents with other strategies and plans of action of the organization;
3. The explicit attribution of specific knowledge management-related responsibilities and competencies to various units, managers and staff members;
4. The existence of policies and training programmes aimed at enhancing the capability, readiness and proactive engagement of staff in knowledge management activities;
5. The existence of direct or indirect positive impacts on the savings and efficiency of the organization's operations, including knowledge sharing and improved transparency. (Holsapple, 2013)

9.3 FUTURE OF KNOWLEDGE MANAGEMENT

Knowledge management has attained considerable attention from scholars and practitioners and is also getting momentum over time (Wiig, 1997). The fast development of information and communications technologies and especially, social media tools significantly contributed to data gathering, storing, and analyzing. As a result, information and knowledge are being shared quickly among individuals and groups within an organization through various channels (Masic, Nesic, Nikolic, & Dzeletovic, 2017). Weidner (2018) argue that rather than exploring the current status of the knowledge management domain it is more important to answer the question, 'where knowledge management is going?' For this, there is a need to focus on the following six predictions:

- Prediction 1: Performance support

- Prediction 2: Knowledge management methodology

- Prediction 3: Knowledge management maturity models

- Prediction 4: Defined competency areas

- Prediction 5: Knowledge management as a transformative discipline

- Prediction 6: Human capital versus technology focus

9.3.1 Prediction 1: Performance Support

The knowledge management field will move from the primary content management source to decision support systems and a process-oriented knowledge base. This change will provide performance support. It will also revolutionize traditional organizational training by focusing more on how to use and leverage knowledge-based tools and content to acquire the best knowledge when it is needed (Weidner, 2018).

9.3.2 Prediction 2: Knowledge Management Methodology

It is anticipated that the field of knowledge management will move from ad-hoc frameworks and roadmaps to robust knowledge management methodologies, a prerequisite of successful knowledge management (Weidner, 2018).

9.3.3 Prediction 3: Knowledge management Maturity Models

The robust knowledge management methodologies will enable us to move from traditional maturity models to develop evidence-based models. The predictive models would perform as prescriptive tools that would ultimately boost performance improvement (Weidner, 2018).

9.3.4 Prediction 4: Defined Competency Areas

It is predicted that the field will move from ill-defined and disparate knowledge management efforts to defined knowledge management competency areas. This change will pave the way for more standardized university curricula. Accordingly, academics would be able to convert the existing knowledge management initiatives into a rich transformative discipline. So, there is a need to more focus on the competency areas such as transformational leadership and strategy (knowledge management frameworks, methodologies, maturity models etc.), knowledge asset and evaluation, culture and communication, collaboration and communities, knowledge asset management, intellectual capital management, organizational learning, knowledge embedded business operations, knowledge technologies, and knowledge architecture (Weidner, 2018).

9.3.5 Prediction 5: Knowledge Management as a Transformative Discipline

Knowledge management is not just another improvement of disciplines like total quality management or business process re-engineering. The field is a key enabler of the required transformation necessary for contemporary firms to function effectively and should sustain in the knowledge age (Weidner, 2018).

9.3.6 Prediction 6: Human Capital Versus Technology Focus

Finally, the future of the knowledge management field depends upon the much-needed focus on increasing human motivations and individual performance in the

knowledge age. It is predicted that a class of knowledge workers will emerge that would be highly motivated and high-performing personal knowledge managers. Consequently, humans will be the centre of gravity for knowledge management moving forward, not technology (Weidner, 2018).

In summary, there would a shift from traditional repositories for content management to muchart process-oriented knowledge bases to get the best knowledge to the right person at the right time. The robust methodologies will replace the ad-hoc frameworks and roadmaps that are inadequate to capture the contemporary and future needs of organizations. The diagnostic and prescriptive maturity models will be introduced. More academic programs (certificate, undergraduate and graduate) will be offered in the knowledge management domain. Finally, high-performance humans, partnered with robots, drones, and artificial intelligence would be able to cheap production anywhere. Since knowledge is dynamic instead of static, therefore, knowledge management continues to evolve as a profession. For the success of the profession, knowledge management requires a holistic perspective that includes business goals, people, processes, technologies, and organizational context (Dalkir, 2017).

9.4 FUTURE OF KNOWLEDGE MANAGEMENT FIELD IN PAKISTAN

The field of knowledge management is at its initial stages in Pakistan. In the recent past, most researchers have investigated knowledge management from three dimensions, namely, practices, barriers/factors and impact on individual and organisational performance (Nawaz & Shaukat, 2014; Karamat, Shurong, Ahmad, Waheed, & Khan, 2018; Riaz & Khalili, 2014). Although there is a clear awareness among academics, institutions, and government circles of the importance of knowledge management; however, research in knowledge management lacks in theory and practice from the Pakistani perspective. So, it is critically important to integrate the efforts of the key stakeholders, for example, academics and practitioners for the development of the field.

For the successful implementation of knowledge management initiatives, Pakistani research scholars should explore enabling factors at the individual (awareness of knowledge management, trust, attitude, motivation, lack of skills), organizational (organization structure and culture, qualified and skilled staff, adequate budgets, policies, and strategies) and technological (IT infrastructure, technical support) level (Kanwal, Nunes, & Arif, 2019).

Knowledge management practices support to the generation of, storing, and dissemination of knowledge for reuse in university research, teaching, and decision-making universities. The universities in Pakistan should practice knowledge management principles and approaches to improve standards and develop knowledge repositories. Doing so, improves not only the performance of universities at the national and international levels but also adds significance addition in the national economy (Mikulecky & Lodhi, 2009). From the Pakistani service industry perspective, Bhatti, Zaheer, and Rehamn (2011) indicated that there is a dire need to bring all stakeholders into confidence to devise a strategy that would consider all organizational knowledge and turn it into the core competency for a sustainable competitive advantage. In contrast, both in business and higher education, practitioners and academics have paid less attention to exploring the knowledge management implications in the knowledge-extensive organizations of the country.

9.5 SELF-ASSESSMENT QUESTIONS

1. Keeping in view the historical developments of the knowledge management field, describe where the knowledge management field is today and where it is heading.

2. What challenges are confronting developing robust knowledge management methodologies?

3. Who did introduce the term, "knowledge worker" and what was the philosophy behind the concept?

4. How many generations of knowledge management have been reported in the extant literature to date? What was the primary focus of each?

5. What are the key benefits of knowledge management in Pakistani higher education institutes?

6. What are the challenges to managing knowledge assets in Pakistani universities?

7. Critically debate where knowledge management stands today and how you foresee the growth of knowledge management in theory and practice in Pakistan.

9.6 ACTIVITIES

1. Conduct a systematic literature review on knowledge management in higher education institutes. Based on the findings, prepare a comprehensive definition of knowledge management, and discuss it with your course tutor.

2. Doing a critical literature review identifies key challenges to knowledge management from the South Asian countries. List the key challenges the knowledge management field is facing. Suggest some practical approaches to address the challenges.

3. Visit some Pakistani software development companies and explore what types of challenges they face to manage knowledge assets.

4. By exploring the knowledge management landscape, develop a strategic plan to manage intellectual assets in Pakistani universities.

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